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January 8, 1999

Derek Matory
EPA Waste Management Division
Site Assessment Branch
Atlanta Federal Center
100 Alabama Street, S.W.
Atlanta, GA 30303

RE: Monsanto Final Report

Dear Derek:

Please find attached a copy of Monsanto Company's Final Remedial Action Report. It and the ROD should provide a fairly comprehensive up-date of remedial activities. A copy of the Five Year Report will also be forwarded for your review.

As always, please let me know if you need any additional information.

Sincerely,

Brenda K Apple

Brenda K. Apple
Manager, EAC-Nashville
Division of Superfund

Xc: DSF Central Office

60-534

FINAL REMEDIAL ACTION REPORT
TENNESSEE SUPERFUND SITE 60-534
OLD PHOSPHORUS DISPOSAL AREA - SITE 3
PHOSPHORUS SLURRY DISPOSAL - SITE 4
NO. 1 POND DISPOSAL FACILITY - SITE 5
OLD TANK FARM - SITE 12
MONSANTO CHEMICAL COMPANY, COLUMBIA, TENNESSEE

Prepared For

MONSANTO CHEMICAL COMPANY

Columbia, Tennessee

Prepared By

ES ENGINEERING-SCIENCE

Atlanta, Georgia

December 1992
AT840

ES ENGINEERING-SCIENCE

See Division Comments dated 2-9-93

See Addendum from Monsanto dated 4-22-93

(Located inside back cover)

* Sites 17+19 (Wells 17-19) should be evaluated carefully at least by 5 year review.

60-534

FINAL REMEDIAL ACTION REPORT
TENNESSEE SUPERFUND SITE 60-534

Old Phosphorus Disposal Area - Site 3
Phosphorus Slurry Disposal - Site 4
No. 1 Pond Disposal Facility - Site 5
Old Tank Farm - Site 12

MONSANTO CHEMICAL COMPANY, COLUMBIA, TENNESSEE

Prepared For

MONSANTO CHEMICAL COMPANY
Columbia, Tennessee

Prepared By

ENGINEERING-SCIENCE, INC.
Atlanta, Georgia

December 1992

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SECTION 1
INTRODUCTION

Monsanto Chemical Company (Monsanto) retained Engineering-Science, Inc. (ES) to prepare a Final Remedial Action Report for Sites 3, 4, 5, and 12 at their facility in Columbia, Tennessee. These sites are identified as State Superfund Site 60-534 on the Tennessee Superfund Promulgated List. The Promulgated List includes those sites within Tennessee that are eligible under the Hazardous Waste Remedial Action Fund for investigation, identification, containment, and clean-up (including monitoring and maintenance). Approval of the Final Remedial Action Report by the Superfund Division of Tennessee Department of Environment and Conservation (TDEC) will complete the remediation process for these sites with the exception of monitoring, maintenance, and periodic evaluation of the remedy's effectiveness.

This report provides the following information:

- Summary of remedial activities;
- As-built costs associated with the remedial action(s);
- Description of material left in place; and
- Operation and Maintenance (O&M) Plan.

The TDEC intends to use the Final Remedial Action Report as an information source during future inspections of the sites.

1.1 REPORT ORGANIZATION

The report is organized as follows:

- Remainder of Section 1 presents the site background;
- Section 2 presents a summary of remedial activities implemented to date and the costs of those activities;
- Section 3 presents an O&M Plan including annual costs for operation and maintenance tasks; and
- Section 4 presents a list of references that are cited in this report.

1.2 SITE BACKGROUND

Engineering-Science has summarized the existing information on site background from the Site Investigation Report [ES 1985] and the Hazard Evaluation/Remedial Alternatives (HE/RA) Report [ES 1990].

1.2.1 Site History

Monsanto began operating an elemental phosphorus plant at Columbia, Tennessee in 1936. The facility, approximately 5,300 acres, is located west of Columbia, Tennessee off Highway 50. Phosphorus ore was processed at this facility to produce elemental phosphorus. Production activities at the plant were terminated in 1986 and the plant has been dismantled. Monsanto currently maintains an office building, an operations building, a phossy water treatment plant, a phosphorus distillation unit, and an analytical laboratory at the facility. Phosphorus, shipped from Monsanto's Idaho Plant, is purified, packaged in drums, and prepared for shipment in the operations building.

While the plant was in operation, waste fluids and materials were stored or disposed at several locations within the facility boundaries. Four sites, namely Old Phosphorus Disposal Area (Site 3), Phosphorus Slurry Disposal (Site 4), No. 1 Pond Disposal Facility (Site 5), and Old Tank Farm (Site 12) were placed on the Tennessee Superfund Promulgated List. Figure 1.1 depicts the location of these sites. Table 1.1 provides a summary description of Sites 3, 4, 5, and 12. Appendix A contains detailed site maps. The sites are covered with clay caps and a hydrogeologic monitoring program is in place at each site.

Site 3 was a phosphorus barrel dump. Drums of phosphorus containing material were reportedly brought here for disposal from 1950 until 1978. The area was closed and capped in 1978. The site was recapped in 1991. During the 1985 site investigation [ES 1985], magnetometry was used to confirm the boundaries of the buried trench. Groundwater beneath this site is monitored quarterly using downgradient monitoring well 3-East.

Site 4 is a closed phosphorus slurry dump. The site received phosphorus containing material, coke dust, and slurry from the phosphorus still and centrifuge from the mid-1950s to 1978. The site was closed and covered with a clay cap (approximately three feet thick) in 1978. This site was recapped in 1987. The site also includes an area where asbestos containing phosphorus was placed, an area where treater oil waste was placed, and an area where some large equipment containing phosphorus were buried. Details regarding geophysical surveys and exploratory borings, which were performed during the site investigation, are presented in the Site Investigation Report [ES 1985]. Groundwater beneath the site is presently monitored quarterly using monitoring wells 4-5, 4-6, 4-7, and 4-8 and groundwater spring P1 (Greg Spring).

Site 5 is a closed sanitary and solid waste disposal area. This site, previously referred to as Tailings Pond No. 1, was used for sanitary and solid waste disposal from the 1950s to 1978. The site was closed in 1978. The site was covered with a three foot

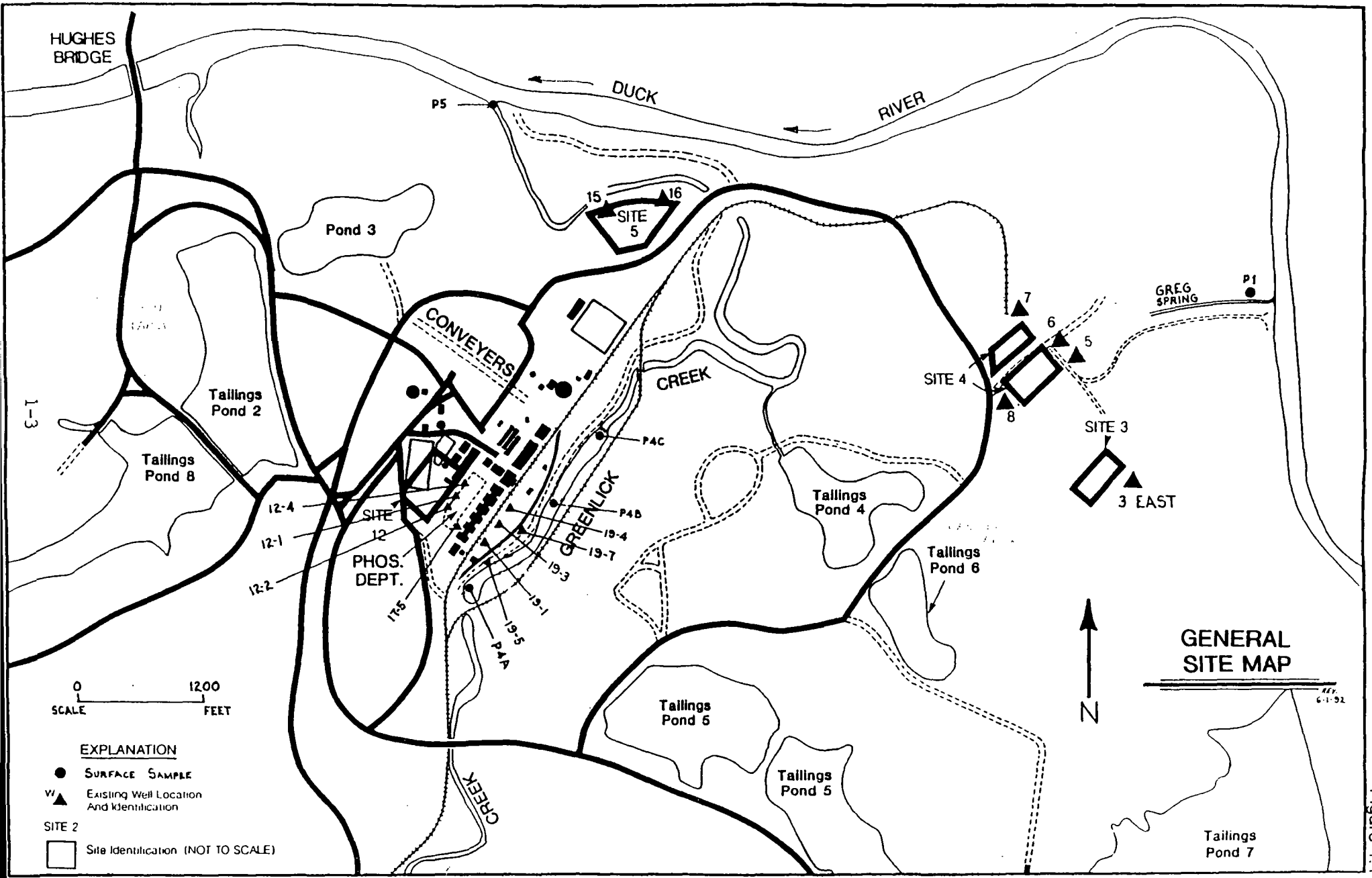
HUGHES BRIDGE
DUCK
RIVER
P5
Pond 3
15
16
SITE 5
CONVEYERS
CREEK
GREG SPRING
P1
7
6
5
SITE 4
8
SITE 3
3 EAST
Tailings Pond 2
Tailings Pond 8
P4C
P4B
19-4
19-7
19-3
19-1
19-5
P4A
GREENLICK
12-4
SITE 12
12-1
12-2
17-5
PHOS. DEPT.
Tailings Pond 4
Tailings Pond 6
Tailings Pond 5
Tailings Pond 5
Tailings Pond 7
N
GENERAL SITE MAP
0
1200
SCALE
FEET
EXPLANATION
SURFACE SAMPLE
Existing Well Location And Identification
SITE 2
Site Identification (NOT TO SCALE)

Figure 1.1

TABLE 1.1[1]
SUMMARY DESCRIPTION OF STATE SUPERFUND SITE 60-534
MONSANTO CHEMICAL COMPANY
COLUMBIA, MAURY COUNTY, TENNESSEE

Site No.	Site	Previous Name at Monsanto	Approximate Years of Operation	Status
3	Old Phosphorus Disposal Area	Phosphorus Barrel Dump	1950-1978	Inactive and covered (recapped in 1991)
4	Phosphorus Slurry Disposal	Phosphorus Slurry Dump	1955-1978	Inactive and covered (recapped in 1987)
5	No. 1 Pond Disposal Facility	Sanitary/Solid Waste Dump	1950-1978	Inactive and covered (1986)
12	Old Tank Farm	Phosphorus Tank Farm	1948-1978	Inactive and covered (1991)

(1) Modification of Table 1.1, Site Investigation Report [ES 1985] and Table 1.1, Hazard Evaluation/Remedial Alternatives Report [ES 1990]

thick clay cap in 1986. Groundwater beneath the site is presently monitored using downgradient monitoring wells 5-15 and 5-16. Also, Greenlick Creek is monitored at location P5 which is downstream of Site 5.

Site 12 is located in the plant area to the west of the present phosphorus storage and shipping area. Twelve gunite (concrete) storage tanks, built partially below grade, were used to store phosphorus and phossy water from 1948 to 1978. Materials stored in the tanks leaked to underlying soil and rocks. The tanks were emptied, cleaned, tops removed, filled with inert material (slag), and covered with soil. In 1978, a retaining wall was constructed downgradient of the site to intercept phosphorus and phossy groundwater. Seepage from the retaining wall is collected in sumps, then treated in the on-site Phossy Water Treatment Plant. The site was capped in 1991.

Groundwater beneath Site 12 is currently monitored using three wells (12-1, 12-2, and 12-4). Figure 1.1 shows the monitoring well locations. The shallow groundwater flows from the site towards Greenlick Creek [ES 1985]; therefore, monitoring wells 17-5, 19-1, 19-3, 19-4, 19-5, and 19-7 are sampled quarterly to detect any movement of elemental phosphorus towards Greenlick Creek. Also, Greenlick Creek is sampled at points P4A, P4B, and P4C (Figure 1.1). Three deep wells (well depth greater than 100 feet), namely 12-9, 19-9, and 19-10 were installed during the HE/RA study to evaluate whether phosphorus had migrated deeper into the bedrock. The results of the aquifer pump test (conducted during the HE/RA study) indicated that two distinct water bearing zones exist in the vicinity of Site 12 and Greenlick Creek with poor vertical communication between the water bearing zones. This conclusion was supported by analytical results which showed that elemental phosphorus was not detected in groundwater samples collected from the deep bedrock wells (12-9, 19-9, and 19-10).

1.2.2 Site Description

Geologically, Monsanto is located on the southern flank of the Nashville Dome. The Dome is a large, elliptical structure of Paleozoic age and is the major geologic structural feature in central Tennessee. The subsurface at Monsanto consists of Ordovian age limestone formation. The overburden material consists of unconsolidated residual silts and clays derived from the limestone bedrock. Monsanto has used slag material, a by-product of plant operations, as road fill throughout the site.

The bedrock limestone formations present at Monsanto include, in increasing age, the Bigby-Cannon Formation, the Hermitage Formation, the Carters Formation, and the Lebanon Formation. Bedrock is exposed in the Greenlick Creek and Duck River Valleys. The Bigby-Cannon Formation immediately underlies the unconsolidated overburden along the ridge tops. The Hermitage Formation underlies the Bigby-Cannon Formation and makes up most of the intermediate slopes between the ridge tops and Greenlick Creek or Duck River. The Hermitage Formation is generally overlain by soils which vary from 3 to 20 feet in thickness.

The water table at the site generally occurs in the Hermitage Formation. Typically, water occurs in secondary openings in the limestone which includes fractures, joints, and solution channels and cavities. Groundwater is present in these secondary openings in all the limestone formations which underlie the facility. The degree to which the secondary openings are interconnected vary from formation to formation and locally within a single formation. Groundwater movement is generally from areas of high topographic areas to low topographic areas such as Greenlick Creek and the Duck River.

Engineering-Science developed a conceptual model of the site hydrogeology based on boring logs, geology, water elevation data, and aquifer response to pumpage during well development. At least two water-bearing zones underlying the study area have been identified based upon ES observations and boring logs recorded during the HE/RA Study [ES 1990]. These zones are listed below:

- the unconfined water table unit (in the overburden and weathered top of bedrock interface);
- the semi-confined or confined unit (in the unweathered bedrock, upper Hermitage Formation and Carters Formation).

The upper water bearing zone (i.e., where the water table forms the upper boundary of the water bearing zone) is present in the overburden and extends approximately 3 to 10 feet into the upper weathered zone of the limestone bedrock. A lower water bearing zone has been identified in the unweathered limestone bedrock. Based on the analysis of aquifer test results and water level data, the lower water bearing zone appears to be partially confined, with poor hydraulic connection to the upper water bearing zone throughout most of the study area (Site 12) except in the vicinity of Greenlick Creek. The HE/RA study indicated that the general groundwater flow direction in the vicinity of Site 12 was from Site 12 towards Greenlick Creek.

1.2.3 Record of Decision

Revised 12-31-92

The TDEC issued a Record of Decision (ROD) for Sites 3, 4, 5, and 12 on ~~September 10, 1992~~ (Appendix B). The ROD presents a selected remedy for each site. The selected remedy for Sites 3, 4, 5, and 12 is no action with the exception of long-term monitoring of groundwater and surface water. The selected remedy for Site 12 included the following:

- Place and compact clay fill over the waste to achieve a low permeability (10^{-7} cms/sec) cover;
- Place a four to six inch thick lift of top soil over the site and seed to produce a good permanent grass cover;
- Perform long-term monitoring of groundwater and surface water; and
- Collect the seepage from the retaining wall (already in place to intercept phosphorus migration) in a sump and treat it at the on-site treatment plant.

Site 12 was capped in 1991. Monsanto submitted a closure report for Site 12 along with closure reports for Sites 3, 4, and 5 to the TDEC on March 25, 1992. The TDEC informed Monsanto that the Superfund Division of TDEC had found the closure reports acceptable.

The ROD presented the following long-term O&M activities:

- Inspect and maintain integrity of covers on a periodic basis;
- Present an inspection schedule in the Final Remedial Action Report;
- Perform quarterly monitoring of groundwater and surface water and report the monitoring data; and
- Submit an annual report that summarizes pertinent site activities.

Monsanto currently performs quarterly monitoring of groundwater and surface water and reports the monitoring data to the TDEC.

SECTION 2
SUMMARY OF REMEDIAL ALTERNATIVES

Monsanto has conducted remedial activities at their facility in Columbia, Tennessee since 1985. In addition, Monsanto has submitted reports to the TDEC after completion of remedial activities [ES 1985, ES 1986a, ES 1986b, ES 1986c, ES 1986d, ES 1990]. This section presents a summary of the remedial activities conducted at the Old Phosphorus Disposal Area (Site 3), Phosphorus Slurry Disposal (Site 4), No. 1 Pond Disposal Facility (Site 5), and Old Tank Farm (Site 12).

2.1 SITE INVESTIGATIONS

Engineering-Science conducted the initial site investigation in 1985 [ES 1985] and two supplementary investigations in 1986 [ES 1986a, ES 1986c]. Also, ES conducted a groundwater investigation [ES 1986b] and a hydrologic study [ES 1986d] in 1986. An HE/RA study of Sites 3, 4, 5, and 12 was concluded in 1990.

2.2 SAMPLING AND ANALYSIS OF SURFACE WATER AND GROUNDWATER

Monsanto submitted a Hydrologic Monitoring Plan for the facility to the State of Tennessee on November 25, 1986. Since 1987, Monsanto has conducted quarterly monitoring of surface water and groundwater in accordance with the plan. Every quarter, groundwater samples are collected from 16 monitoring wells and surface water samples are collected from five locations within the facility. The surface water and groundwater samples are analyzed for the following parameters:

- pH
- Temperature
- Specific Conductivity
- Lead
- Chromium
- Arsenic
- Cyanide
- Fluoride
- Phosphate (PO_4 soluble)
- Elemental Phosphorus (P_4)

The groundwater level in each monitoring well is recorded during every sampling event. Monsanto has submitted the monitoring data quarterly to the TDEC.

2.3 PHOSSY WATER TREATMENT PLANT

Monsanto constructed a phossy water treatment plant at their facility in Columbia, Tennessee. Seepage from the retaining wall (contiguous to Site 12) is collected in a sump, then treated at the phossy water treatment plant. In addition to the treatment plant, Monsanto maintains an analytical testing laboratory at the facility. Monsanto's analytical laboratory performs elemental phosphorus analysis of the surface water and groundwater samples that are collected every quarter.

2.4 HAZARD EVALUATION/REMEDIAL ALTERNATIVES (HE/RA) STUDY

Engineering-Science performed a HE/RA Study of Sites 3, 4, 5, and 12 in 1990 [ES 1990]. The purpose of the HE/RA Study was to present information to the Superfund Division of TDEC so that the TDEC could select a remedial alternative and issue a Record of Decision (ROD) for each site. The TDEC issued a ROD for the sites on September 10, 1992.

2.5 CLOSURE OF SITES 3, 4, 5, AND 12

Monsanto conducted closures of Sites 3, 4, 5, and 12 and provided the closure reports [Ogden 1992a, Ogden 1992b, Ogden 1992c, and Ogden 1992d] to the TDEC. Site closure consisted of capping and grading the sites. The TDEC informed Monsanto in April 1992 that the Superfund Division personnel had reviewed the closure reports for Sites 3, 4, 5, and 12 and found them acceptable. Each site closure (i.e., Sites 3, 4, 5, and 12) was consistent with the remedial alternative specified in the ROD for the site.

2.6 VOLUME AND DESCRIPTION OF MATERIAL LEFT IN PLACE

The actual volumes of waste that Monsanto left in place at each site is unknown. An approximate quantity of waste materials deposited at each site is presented in Table 2.1. Elemental phosphorus is the principal constituent of concern at Sites 3, 4, 5, and 12. Data on elemental phosphorus are tabulated in Table 2.2. Elemental phosphorus ignites spontaneously on contact with air at temperatures at or above 86°F (30°C). The melting point of elemental phosphorus is 111°F (44°C) and its solubility in water is 3 mg/L at 59°F (15°C). The specific gravity of elemental phosphorus is 1.82 which indicates that it will sink in a column of water.

During the HE/RA Study, ES examined toxicity and environmental health effects data in the EPA Integrated Risk Information System (IRIS) database, contacted EPA Washington, D.C., and Monsanto, St. Louis, then concluded that there is no published human toxicity or health effects data for elemental phosphorus. Information on toxicity of phosphorus to aquatic species has been developed, mainly from studies initiated in late 1960s in response to a massive fish kill caused by wastewater discharged from the ERCO

TABLE 2.1
APPROXIMATE QUANTITY OF WASTE MATERIALS DEPOSITED AT SITES 3, 4, 5, AND 12 MONSANTO CHEMICAL COMPANY COLUMBIA, MAURY COUNTY, TENNESSEE

Site No.	Site Name	Approximate Quantity of Waste Material (yd^3)	Type of Waste Material(1)
3	Old Phosphorus Disposal Area	48,000	b,c
4	Phosphorus Slurry Disposal	290,000	b,c,e
5	No. 1 Pond Disposal Facility	97,0000	b,e
12	Old Tank Farm	24,000	a,b,d

(1) Waste Types:

a- Elemental Phosphorus Leakage
b - Dry Materials Contaminated with Elemental Phosphorus
c - Wet Materials Contaminated with Elemental Phosphorus
d - Phossy Water
e - Other Material (material not contaminated with elemental phosphorus)

TABLE 2.2
DATA ON ELEMENTAL PHOSPHORUS (P_4)
MONSANTO CHEMICAL COMPANY
COLUMBIA, MAURY COUNTY, TENNESSEE

Waxy solid, normally pale yellow to straw-colored

DOT Hazard Class:	Flammable Solid/UN1381
Autoignition Temperature:	86°F
Molecular Weight:	123.89
Specific Gravity at 68°F:	1.82
Melting Point	111°F
Boiling Point:	536°F
Solubility in water at 59°F	0.0003 gm/100 cc
Solubility in alcohol:	0.3 gms/100 cc
Solubility in CS_2:	880 gms/100 cc
Airborne Exposure Limit:	
OSHA PEL 8 hr TWA:	0.1 mg/m^3
STEL:	0.3 mg/m^3
EPA Quality Criteria for Water:	0.1 ug/L (yellow phosphorus in marine/estuarine waters)
Monsanto NPDES Permit Discharge Limit:	5 ug/L
LC_{50} for bluegill sunfish:	
at 48 hours:	0.105 mg/L
at 160 hours:	0.025 mg/L

plant in Newfoundland, which produced elemental phosphorus. As the ERCO fish kill occurred in marine/estuarine waters, the recommended criterion of 0.1 ug/L for yellow phosphorus is for marine/estuarine waters [EPA 1986]. EPA has published LC_{50} concentrations for bluegill sunfish (freshwater species) of 0.105 mg/L at 48 hours and 0.025 mg/L at 160 hours [EPA 1986]. Phosphorus does not have a maximum contaminant level (MCL) under the Safe Drinking Water Act (SDWA). The Monsanto Plant NPDES permit concentration limit for discharge of elemental phosphorus in wastewater is 5 ug/L.

2.7 AS-BUILT REMEDIATION COST

The total as-built remediation cost at Columbia is $4,560,000. The as-built cost includes $450,000 for site studies and preparation of reports, $963,000 for capping sites, and $3,147,000 for construction of the phossy water treatment plant.

2.8 MONITORING RESULTS AND PROPOSED MONITORING PROGRAM

Monsanto has conducted quarterly monitoring of groundwater beneath Sites 3, 4, 5, and 12 and surface water since 1987. Every quarter, groundwater samples are collected from 16 monitoring wells and surface water samples are collected from five locations within the facility. The groundwater and surface water samples are analyzed for the following parameters.

- pH
- Temperature
- Specific Conductivity
- Lead
- Chromium
- Arsenic
- Cyanide
- Fluoride
- Phosphate (PO_4 soluble)
- Elemental Phosphorus (P_4)

The groundwater level in each monitoring well is recorded during every sampling event.

The monitoring data, collected quarterly since 1987 for Sites 3, 4, 5, and 12 (Appendix C), indicate the following:

- monitoring wells 12-1, 12-2, and 12-4 are located near a "source" of elemental phosphorus;
- monitoring wells 4-7 and 4-8 are frequently dry during sampling events;
- the constituents concentration in monitoring wells 3-East, 4-5, 4-6, 5-15, and 5-16 do not change significantly from quarter to quarter; and
- the lead and chromium levels in groundwater and surface water samples are rarely above their detection limits.

SECTION 3
OPERATION AND MAINTENANCE PLAN

This section presents an Operation and Maintenance (O&M) plan for Sites 3, 4, 5, and 12 at the Monsanto Chemical Company, Columbia, Maury County, Tennessee. The sites are collectively identified as State Superfund Site 60-534 on the Tennessee Superfund Promulgated List. The O&M plan describes the O&M activities, provides an annual cost for implementing the O&M activities, and presents a reporting schedule and review cycle for the O&M activities.

3.1 DESCRIPTION OF O&M ACTIVITIES

The principal O&M activities for Sites 3, 4, 5, and 12 at Monsanto are as follows:

- Maintenance of the cover placed on each site;
- Long-term monitoring of surface water and groundwater; and
- Collection and treatment of seepage from the retaining wall downgradient from Site 12 at the on-site phossy water treatment plant.

Monsanto maintains an inorganics analytical testing laboratory at their facility in Columbia, Tennessee.

3.1.1 Maintenance of Covers at Sites 3, 4, 5, and 12

Monsanto conducted site closures by placing a compacted clay cover (cap) on each site. The TDEC informed Monsanto that the site closures as reported were acceptable. The covers will need routine maintenance to address the following:

- Subsidence of cover
- Surface erosion of cover
- Impaired vegetation

Tables 3.1 through 3.4 present a checklist that Monsanto will use during site maintenance inspections. Monsanto will report the maintenance activities to the TDEC once a year during the O&M period. Table 3.5 contains inspection guidelines and suggested observations which will be utilized by the Monsanto inspector when filling out the inspection forms presented in Tables 3.1 through 3.4.

TABLE 3.1
RECORD OF MAINTENANCE OF COVER
(OLD PHOSPHORUS DISPOSAL AREA SITE 3)
MONSANTO CHEMICAL COMPANY
COLUMBIA, MAURY COUNTY, TENNESSEE

Inspection Item	Inspection Date (1)	Inspected By (2)	Observation (3)	Follow-Up Action (4)	Date of Completion of Follow-Up Action (5)
Surface Erosion					
Cover Subsidence					
Vegetation Repair					

Keys:
(1) Enter inspection date
(2) Enter inspector's name
(3) Enter acceptable only if an inspection item does not need a follow-up action, enter deficient if an inspection item needs follow-up action
(4) Describe follow-up action
(5) Enter date of completion

TABLE 3.3
RECORD OF MAINTENANCE OF COVER
(NO. 1 POND DISPOSAL FACILITY - SITE 5)
MONSANTO CHEMICAL COMPANY
COLUMBIA, MAURY COUNTY, TENNESSEE

Inspection Item	Inspection Date (1)	Inspected By (2)	Observation (3)	Follow-Up Action (4)	Date of Completion of Follow-Up Action (5)
Surface Erosion					
Cover Subsidence					
Vegetation Repair					

Keys:
(1) Enter inspection date
(2) Enter inspector's name
(3) Enter acceptable only if an inspection item does not need a follow-up action, enter deficient if an inspection item needs follow-up action
(4) Describe follow-up action
(5) Enter date of completion

TABLE 3.4
RECORD OF MAINTENANCE OF COVER
(OLD TANK FARM - SITE 12)
MONSANTO CHEMICAL COMPANY
COLUMBIA, MAURY COUNTY, TENNESSEE

Inspection Item	Inspection Date (1)	Inspected By (2)	Observation (3)	Follow-Up Action (4)	Date of Completion of Follow-Up Action (5)
Surface Erosion					
Cover Subsidence					
Vegetation Repair					

Keys:
(1) Enter inspection date
(2) Enter inspector's name
(3) Enter acceptable only if an inspection item does not need a follow-up action, enter deficient if an inspection item needs follow-up action
(4) Describe follow-up action
(5) Enter date of completion

TABLE 3.5
COVER INSPECTION GUIDELINES AND OBSERVATIONS
MONSANTO CHEMICAL COMPANY
COLUMBIA, MAURY COUNTY, TENNESSEE

General Inspection Guidelines

1. Inspect covers quarterly
2. Inspection should be undertaken soon after a rainfall event
3. Inspector should divide the cover into an imaginary grid and walk the gridlines so the cover is completely viewed.

Inspection Item	Possible Observations
Surface Erosion	• Dead or stressed vegetaton • Exposed soil, gulleys
Cover Subsidence	• Ponded water on cover after recent rainfall • Visual depression in cover
Vegetation Repair	• Grass requires mowing • Grass laying down, matted

Monsanto personnel will monitor the subsidence of covers by inspecting the cover at least once quarterly after a rainstorm for depression and accumulation of water on the surface of the cover. The corrective measures for subsidence of a cover would include removal of the vegetation in the area of subsidence, backfilling the area with cover material, replacing the soil cover over the area, and revegetating.

Monsanto personnel also will inspect the cover quarterly for surface erosion. Soil cover will be placed and revegetated on the cover area affected by erosion. If particular areas of the soil covers require repeated repair, the use of geosynthetic erosion control blanket will be evaluated. The vegetated cover will be mowed to prevent the growth of deep-rooted vegetation. Mowed vegetation will be removed to prevent damage to grass cover.

3.1.2 Long-Term Monitoring of Groundwater and Surface Water

Monsanto will continue monitoring groundwater beneath Sites 3, 4, 5, and 12 and surface water during the O&M period. The proposed monitoring program for groundwater and surface water is described in Subsection 2.8. The proposed monitoring schedule for each site, including sampling locations, sampling frequency, and constituents, is presented in Table 3.6.

Monsanto will submit monitoring data to the TDEC once a year. Monsanto will perform an annual review of the monitoring data and schedule a review with TDEC at least once every five years beginning with the year 1997.

3.1.3 Phossy Water Treatment Plant

Monsanto will operate the phossy water treatment plant to treat seepage from the retaining wall during the O&M period. In addition, the on-site analytical testing laboratory will be maintained.

3.2 ESTIMATED ANNUAL COST FOR IMPLEMENTING THE O&M ACTIVITIES

The annual cost for implementing the O&M activities at Sites 3, 4, 5, and 12 is estimated to be $1,268,000. The annual cost, presented in 1992 dollars, does not include any escalation for inflation during succeeding years. Table 3.7 presents a breakdown of the annual cost. The annual personnel cost includes $1,000 for maintenance of covers. The annual maintenance cost of $40,000 includes $9,000 for maintenance of covers and $31,000 for engineering evaluations. The annual cost of testing and laboratory expense ($31,000) includes only the costs associated with monitoring and analyses of groundwater and surface water. The annual operating cost of the phossy water treatment plant is $1,195,000.

TABLE 3.6
MONITORING SCHEDULE FOR SITES 3, 4, 5, AND 12
MONSANTO CHEMICAL COMPANY
COLUMBIA, MAURY COUNTY, TENNESSEE

Site	Sampling Location*	Sampling Frequency	Constituents
3	MW** 3-East	Semi-Annual	pH, temperature, specific conductivity, arsenic, cyanide, fluoride, phosphate, and elemental phosphorus
4	MWs 4-5 and 4-6	Semi-Annual	Same as above
	P1***	Quarterly	Same as above
5	MWs 5-15 and 5-16	Semi-Annual	Same as above
	P5	Quarterly	Same as above
12	MWs 12-1, 12-2, and 12-4	Annual semi-	Same as above
	MWs 17-5, 19-1, 19-3, 19-4, 19-5, and 19-7	Quarterly	Same as above
	P4A, P4B, P4C	Quarterly	Same as above

* Sampling locations are shown on detailed site maps that are presented in Appendix A.

** Monitoring Well

*** Surface water sampling location P_

TABLE 3.7
ANNUAL COSTS FOR IMPLEMENTING OPERATION AND MAINTENANCE ACTIVITIES MONSANTO CHEMICAL COMPANY COLUMBIA, MAURY COUNTY, TENNESSEE

Item	Annual Cost[1]
Cost of Personnel	$1,000
Cost of Anticipated Maintenance	40,000
Cost of Testing and Laboratory Expense	31,000
Cost of Equipment and Supplies	1,000
Cost of Operation	1,195,000
Total Annual Cost	$1,268,000

(1) The annual cost is presented in 1992 dollars with no escalation for inflation during succeeding years.

SECTION 4
REFERENCES

EPA 1986, *Quality Criteria for Water 1986*,EPA 440/5-86-001, May 1, 1986 (51 Federal Register 43665), "Gold Book."

ES 1985, *Site Investigation Report*, prepared by Engineering-Science, Inc. for Monsanto Industrial Chemical Company, Columbia, Tennessee, December 1985.

ES 1986a, *Supplementary Site Investigations, Columbia, Tennessee Plant*, prepared by Engineering-Science, Inc. for Monsanto Industrial Chemical Company, Columbia, Tennessee, March 1986.

ES 1986b, *Groundwater Investigation , Columbia, Tennessee Plant*, prepared by Engineering-Science, Inc. for Monsanto Industrial Chemical Company, Columbia, Tennessee, May 1986.

ES 1986c, *Supplementary Site Investigation - Site 20*, prepared by Engineering-Science, Inc. for Monsanto Industrial Chemical Company, Columbia, Tennessee, September 1986.

ES 1986d, *Hydrologic Monitoring Report*, prepared by Engineering-Science, Inc. for Monsanto Industrial Chemical Company, Columbia, Tennessee, October 1986.

ES 1990, *Hazard Evaluation/Remedial Alternatives Report*, prepared by Engineering-Science, Inc. for Monsanto Industrial Chemical Company, Columbia, Tennessee, September 1990.

Ogden 1992a, *Closure Report for Site 3*, prepared by Ogden Environmental and Energy Services Co., Inc. for Monsanto Industrial Chemical Company, Columbia, Tennessee.

Ogden 1992b, *Closure Report for Site 4*, prepared by Ogden Environmental and Energy Services Co., Inc. for Monsanto Industrial Chemical Company, Columbia, Tennessee.

Ogden 1002c, *Closure Report for Site 5*, prepared by Ogden Environmental and Energy Services Co., Inc. for Monsanto Industrial Chemical Company, Columbia, Tennessee.

Ogden 1992d, *Closure Report for Site 12*, prepared by Ogden Environmental and Energy Services Co., Inc. for Monsanto Industrial Chemical Company, Columbia, Tennessee.

APPENDIX A
DETAILED SITE MAPS

APPENDIX B
RECORD OF DECISION

STATE OF TENNESSEE
DIVISION OF SUPERFUND
RECORD OF DECISION

Remedial Alternative Selection
for
Monsanto Chemical Company
Site ID # 60-534
Site ID # 60-535
Site ID # 60-536
Site ID # 60-537

I. SITE:

Monsanto Chemical Company, Maury County, Tennessee

II. DOCUMENTS REVIEWED:

- Site Investigation, Engineering Science, December 1985
- Hydrologic Monitoring Report, ES, October 1986
- Supplementary Site Investigation-Site 20, ES, September 1986
- Ground-Water Investigation, ES, May 1986
- Supplementary Site Investigation, ES, March 1986
- Remedial Action Plan, March 1986
- Hazard Evaluation/Remedial Alternatives Report, ES, September 1990

III. DESCRIPTION OF THE SELECTED REMEDY:

The selected alternative is protective of human health, safety, and the environment as described in the Hazard Evaluation/Remedial Alternatives Report, September 1990.

The selected remedy for Sites 3, 4 and 5 is Alternative 1, which includes:

1. No action with the exception of long term monitoring of ground and surface water. This alternative is in light of the fact that a clay cap has already been installed on the sites.

2. Specifications on the caps have been forwarded to the Department.

The selected remedy for Site 12 is Alternative 2, which includes:

1. Clay fill used to cover the waste, compacted to achieve a low-permeability (10-7 cm/sec) cover.

2. Place a (4) to six (6) inches of top soil over the site and seed to produce a good permanent grass cover.

3. Long term monitoring of ground and surface water.

4. A retaining wall is already in place down gradient of the site to intercept phosphorus migration in ground water.

5. Seepage from the retaining wall is collected and treated on-site in a wastewater treatment plant designed for this purpose.

The long term operation and maintenance (O&M) activities are projected to include:

1. Inspect and maintain the integrity of the cover on a periodic basis. The schedule will be established in the Final Report.

2. Quarterly ground and surface water monitoring and reporting.

3. Annual reporting to summarize pertinent site activities and/or details.

Declarations:

Consistent with Part 2 of The Hazardous Waste Management Act as amended 1986 (the State Superfund Law), I have determined that the selected remedial actions at the Monsanto sites are cost effective remedies that will provide adequate protection to the public health, welfare and the environment.

12-31-92
Date

Kenneth W. Bunting, Acting Director
Division of Superfund
Tennessee Department of Environment
and Conservation

NFO

Record of Decision

Monsanto Chemical Company
Columbia, Maury County, Tennessee
State ID # 60-534
State ID # 60-535
State ID # 60-536
State ID # 60-537

SITE BACKGROUND AND HISTORY

The Monsanto property is located off Highway 50, west of Columbia, Tennessee and encompasses approximately 5300 acres. Monsanto began operating an elemental phosphorus plant at Columbia in 1936. Phosphorus ore was mined and processed at this facility to produce elemental phosphorus. Production activities at the plant were terminated in October 1986 and the plant is currently being dismantled. Some structures will remain after the dismantling process including the office building and an operations building where phosphorus , which is shipped in from Monsanto's Idaho plant, is packaged in drums and prepared for shipment.

While the plant was in operation, waste fluids and materials were stored or disposed of at several locations within the facility boundaries. Twenty-one such sites have been identified and investigated. A preliminary evaluation was conducted in 1985 at each site with respect to site characteristics and potential impact to groundwater. A program for monitoring groundwater was established at eleven of the sites. The program included drilling test borings, installing groundwater monitoring wells, measuring water levels and sampling and analyzing groundwater. As a result of the findings of these initial investigations, four of the sites were placed on the Tennessee Superfund Promulgated List in 1985. The four sites include the Old Phosphorus Disposal Area (Site 3), Phosphorus Slurry Disposal (Site 4), No.1 Pond Disposal Facility (Site 5), and the Old Tank Farm (Site 12)[See Table 1.1 attached]. A detailed description of each site follows:

Site 3 was a phosphorus barrel dump. Drums of phosphorus containing material were reportedly brought here for disposal from 1950 until 1978. The area was closed and capped in 1978 and recapped in 1991 as part of final remediation activities.

Site 4 is a closed phosphorus slurry dump. The site received phosphorus containing material, coke, dust, and slurry from the phosphorus still and centrifuge from the mid-1950's to 1978. The site also includes an area where asbestos containing phosphorus was placed, an area where treated oil waste was placed, and an area where some large equipment containing phosphorus was buried. The site was closed and covered with a clay cap (approximately three feet thick) in 1978 and recapped in 1987.

Site 5 is a closed sanitary and solid waste disposal area. This site, previously referred to as Tailings Pond No. 1, was used for sanitary and solid waste disposal from the 1950's to 1978. The site was closed in 1978. The eastern

portion of the site was covered with a three foot thick clay cap in 1987 and the western portion of the site was capped in 1989.

Site 12 is located in the plant area to the west of the phosphorus storage and shipping area. Twelve gunite (concrete) storage tanks, which were built partially below grade, were used to store phosphorus and phossy water from 1948 to 1955. Materials stored in the tanks leaked to underlying rocks and soil. The tanks were emptied, filled with slag and covered with soil. Elemental phosphorus was recovered downgradient and drummed. A retaining wall was constructed in the early 1980's downgradient of the site to intercept phosphorus migration in the groundwater. Seepage from the retaining wall is collected in sumps and treated in the on-site wastewater treatment plant. The site was capped in 1991 as part of the final remediation activities.

PROBLEM DEFINITION

Contaminants of Concern

The following contaminants in groundwater, soils, and surface water have been analyzed for: Lead, Chromium, Arsenic, Cyanide, Fluoride, Phosphate (PO4 soluble) and Elemental Phosphorus (P4). Only elemental phosphorus has been found at significantly high levels.

Elemental phosphorus is a waxy solid, normally pale yellow to straw colored. It ignites spontaneously on contact with air at temperatures at or above 86 degrees F. The melting point of phosphorus is 111degrees F and the solubility is 3 mg/L (at 54 degrees F).

Groundwater Quality

Monsanto submitted a Hydrologic Monitoring Plan to the State of Tennessee in 1986. In accordance with the plan, Monsanto has conducted quarterly monitoring of groundwater and surface water since 1987. Every quarter, groundwater samples are collected from 38 monitoring wells and the groundwater level is recorded.

The concentrations of lead, chromium, arsenic and fluoride in the groundwater at the 4 sites are less than the Safe Drinking Water Act (SDWA) maximum contaminant levels (MCL's) with the exception of arsenic at Site 4 as described below. Phosphate and Cyanide do not have a MCL but are not considered major contaminants of concern. Elemental phosphorus also does not have a MCL but is considered the major contaminant of concern.

Site 3. Groundwater beneath this site is monitored quarterly utilizing well #3 east. Elemental phosphorus levels have been consistently low and have not been over 0.01 ppb since the fourth quarter of 1987.

Site 4. Groundwater beneath this site is monitored quarterly utilizing wells 4-5, 4-6, 4-7 and 4-8. Arsenic levels in well 4-6 have exceeded the MCL of 0.05 ppm on occasion with a level of 0.088 ppm. Elemental phosphorus levels have been consistently low and have not been over 0.03 ppb since 1987 with the exception of one quarter.

Site 5. Groundwater beneath this site is monitored quarterly utilizing wells 5-15 and 5-16. Elemental phosphorus levels have been fairly low over the three and a half year monitoring period fluctuating between 0.002 ppb and 0.205 ppb.

Site 12. Groundwater beneath Site 12 is monitored quarterly utilizing wells 12-1, 12-2 and, 12-4. Elemental phosphorus levels have fluctuated significantly between 0.003 ppb and 265 ppb in two of the wells (12-1 and 12-4). Most significantly, levels in well 12-4 have demonstrated an increasing trend. Levels have been consistently high in the other well (12-2) ranging between 1.48 ppb and 1,440 ppb with an average of approximately 905 ppb.

Because the shallow groundwater generally flows from the site towards Greenlick Creek, monitoring wells 17-5, 19-1, 19-3, 19-4, 19-5, and 19-7 are sampled quarterly to detect any movement of elemental phosphorus towards Greenlick Creek. The four wells between Site 12 and Greenlick Creek (17-5, 19-1, 19-4 and 19-3) have shown highly fluctuating ranges of phosphorus from 0.001 to 790 ppb with no significant trends up or down. The two wells nearer Greenlick Creek (19-5 and 19-7) have shown less moderate levels of phosphorus ranging between 0.002 to 20.0 ppb.

Three deep wells (well depth greater than 100 feet), namely 12-9, 19-9, and 19-10, were installed and monitored during the HE/RA study to evaluate the potential for phosphorus to migrate deeper into the bedrock. Well 12-9 is located near the highly contaminated shallow well (12-2) and has shown no phosphorus contamination at the detection limit of 0.008 ppb. Wells 19-9 and 19-10 have likewise shown no contamination at the detection limit.

In summary, significant migration of phosphorus in the shallow unconfined aquifer is not occurring at Sites 3, 4 and 5. There does appear to be some migration in the deeper semi-confined aquifer at Site 12. With groundwater flow towards Greenlick Creek, it is important to note that wells between Site 12 and the creek have fluctuated in levels of phosphorus and wells near the creek have shown lesser amounts. The deep wells have not shown evidence of contamination.

Surface Water Quality

As part of the Supplementary Site Investigation performed in 1986, surface water samples were collected from nine locations. These included an on-site pond and spring effluent, one location on Gin Creek, four locations on Greenlick Creek and two locations on the Duck River. According to the Hydrologic Monitoring Plan, surface water samples at seven of these locations have been monitored on a quarterly basis since 1987.

The concentrations of lead, chromium, arsenic and fluoride in surface water have been less than the SDWA MCL's. Point source discharges to Greenlick Creek and the Duck River are presently regulated by NPDES permit through the Tennessee Division of Water Pollution Control. Two outfalls (002 and 011) discharge to the Duck River and two outfalls (005 and 009) discharge to Greenlick Creek. Parameters monitored include: Total Suspended Solids, Total Phosphates, Soluble Fluoride, Elemental Phosphorus, Cyanide, Chlorine and pH. An acceptable discharge level of 5 ppb of elemental phosphorus has been established. All effluent limitations are presently being met.

REMEDIAL ACTION

Objectives

Remedial action objectives include:

* Stabilizing the amount of phosphorus leaching into the groundwater.

* Reducing the migration of phosphorus from the sites.

Options

The following alternatives were developed for the Old Phosphorus Disposal Area (Site 3), the Phosphorus Slurry Disposal (Site 4), and the No. 1 Pond Disposal Facility (Site 5):

Alternative 1 - No action with the exception of long term monitoring of groundwater (Sites 3, 4 and 5) and surface water (Site 5).

Alternative 2 - Excavation of contaminated material, placement of excavated material in the on-site permitted landfill, backfill excavated area with clean soil, cap, regrade, and long term monitoring of ground water (Sites 3, 4 and 5) and surface water (Site 5).

Alternative 3 - Excavation of contaminated material, treatment of excavated material in ERCO still, backfill excavated area with clean fill, cap, regrade, and long term monitoring of ground water (Sites 3, 4 and 5) and surface water (Site 5).

The following alternatives were developed for the Old Tank Farm (Site 12):

Alternative 1 - No action with the exception of long term monitoring of ground water and surface water.

Alternative 2 - Covering the site with either a clay cap or a multi-media cap and long term monitoring of ground water and surface water.

Alternative 3 - Covering the site with either a clay cap or a multi-media cap, extraction of shallow ground water, treatment of extracted ground water, and long term monitoring of ground water and surface water.

Alternative 4 - Excavation of contaminated material, placement of excavated material in the on-site permitted landfill, backfill excavated area with clean fill, cap, regrade, and long term monitoring of ground water and surface water.

Alternative 5 - Excavation of contaminated material, treatment of excavated material in ERCO still, backfill excavated area with clean fill, cap, regrade, and long term monitoring of groundwater and surface water.

Selected Alternatives

Site 3. The alternative for this site was comprised of recapping with long term monitoring of groundwater. Specifications on the cap have been forwarded to the Department. Quarterly groundwater monitoring data indicates no significant increases in phosphorus concentrations since 1987.

Sites 4 and 5. The alternative for these sites was comprised of no action with the exception of long term monitoring of groundwater at site 4 and long term monitoring of groundwater and surface water at site 5. Site 4 was covered with a clay cap in 1978 and recaped in 1987. The eastern portion of Site 5 was covered in 1987 and the western portion of the site was capped in 1989. Specifications on the caps have been forwarded to the Department. Quarterly groundwater and surface water monitoring data indicates no significant increases in phosphorus concentrations since 1987.

Site 12. The alternative for this site was comprised of capping with long term monitoring of groundwater and surface water. A clay cap was utilized on Site 12 in conjunction with asphalt and concrete capping of the adjacent drum handling area. A retaining wall was already in place downgradient of the site to intercept phosphorus migration in groundwater. Seepage from the retaining wall is collected in sumps then treated in the onsite wastewater treatment plant. Specifications for the cap have been forwarded to the Department and the capping activities were completed in 1991.

COMMUNITY RELATIONS

Public Announcements concerning proposed site activities were placed in "The Daily Herald," a local newspaper, for three consecutive issues in December of 1990. No questions or comments were received; therefor, a Public Meeting was not considered necessary and was not held.

OPERATION AND MAINTENANCE

Operation and maintenance requirements will be outlined in the Final Report which will also outline future monitoring requirements. Continued monitoring of groundwater on a periodic basis will allow evaluation of whether or not migration of phosphorus continues. In the event of migration in the future, the feasibility of shallow ground- water recovery using pump and treat systems (or other systems) will have to be examined.

TABLE 1.1[a]
SITE SUMMARY
MONSANTO CHEMICAL COMPANY
COLUMBIA, TENNESSEE

Site No.	Site Name on State of Tennessee's Promulgated List	Site Name at Monsanto	Approximate Years of Operation	Status	Monitoring Program
3	Old Phosphorus Disposal Area	Barrel Dump	1950-1978	Inactive and covered	One shallow well
4	Phosphorus Slurry Disposal	Phosphorus Slurry Dump	1955-1978	Inactive and covered	Four shallow wells
5	No. 1 Pond Disposal Facility	Sanitary/Solid Waste Dump	1950-1978	Inactive and covered	Two shallow wells
12	Old Tank Farm	Phosphorus Tank Farm	1948-1955	Inactive	Nine shallow wells; three deep wells

(a) - Modified Table 1.1, Site Investigation Report (ES 1985).

ENGINEERING-SCIENCE, INC.
57 Executive Park South
Suite 590
Atlanta, Georgia 30329

APPENDIX C
MONITORING DATA

ENTER CODE FOR CHOICE OF ACTIVITY

DATE: 10/17/93
TIME: 13:00:33

COLUMBIA, TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/93

WELL NO: P1
SITE NO: POINT 1
SITE NAME: GREG'S SPRING

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
03/23/87	0	0	7.5	31.050	1.86	* 0.000	* 0.000	* 0.000	* 0.0	0.004	-
06/08/87	18	391	7.6	22.890	1.38	* 0.000	* 0.000	* 0.000	* 0.0	0.002	-
09/01/87	17	400	7.9	13.240	0.89	* 0.000	* 0.000	* 0.000	* 0.0	0.007	-
12/07/87	14	420	7.5	13.800	0.73	< 0.050	< 0.040	< 0.050	< 5.0	0.006	-
03/07/88	12	385	7.3	18.700	1.24	< 0.050	< 0.040	< 0.050	< 5.0	0.003	-
06/06/88	20	375	8.0	4.850	0.92	< 0.050	< 0.040	< 0.050	< 5.0	0.017	-
09/06/88	16	350	7.5	0.200	0.77	< 0.050	< 0.040	< 0.050	< 5.0	0.002	-
12/05/88	6	551	7.3	26.660	1.36	< 0.003	< 0.010	0.011	< 5.0	0.002	-
03/06/89	13	320	8.1	14.750	1.22	0.003	< 0.010	< 0.010	< 5.0	0.002	-
06/12/89	19	314	7.4	13.800	0.91	< 0.003	< 0.010	< 0.010	< 5.0	0.003	-
09/11/89	22	424	8.0	6.910	0.80	0.006	< 0.010	< 0.010	< 5.0	0.002	-
12/04/89	8	408	7.1	20.300	0.94	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
03/12/90	17	300	7.0	44.000	1.36	0.003	< 0.010	< 0.010	< 5.0	0.002	-
06/01/90	17	380	7.1	13.870	0.88	< 0.003	< 0.010	< 0.010	< 5.0	0.006	-
09/10/90	22	340	7.1	5.630	1.90	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
12/03/90	7	360	8.4	13.900	0.78	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
03/18/91	11	330	7.4	0.693	0.99	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
06/03/91	17	400	6.0	12.700	0.82	0.011	< 0.010	< 0.010	< 5.0	0.002	-
09/09/91	21	530	8.1	5.900	0.44	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
12/09/91	10	420	7.4	24.900	1.34	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
03/02/92	12	300	7.2	18.533	1.12	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
06/01/92	15	410	7.1	7.320	0.60	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-

ENTER CODE FOR CHOICE OF ACTIVITY 4

DATE: 10/23/92
TIME: 13:06:50

COLUMBIA, TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: P-4A
SITE NO: POINT 4A
SITE NAME: SOUTH NO. 13 BASIN

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLP
09/11/89	26	443	8.1	0.180	1.29	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
12/04/89	9	389	7.0	0.233	7.31	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
03/12/90	19	353	7.4	0.331	0.46	< 0.003	0.030	< 0.010	< 5.0	0.004	-
06/01/90	23	350	7.2	0.254	0.59	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
09/10/90	27	320	7.6	0.150	1.58	< 0.003	< 0.010	< 0.010	< 5.0	0.001	-
12/03/90	8	360	7.1	0.310	0.54	0.004	< 0.010	< 0.010	< 5.0	0.002	-
03/18/91	14	320	7.0	0.257	0.56	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
06/03/91	22	720	6.3	0.330	0.79	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
09/09/91	26	500	8.0	0.247	1.02	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
12/09/91	15	290	7.2	0.384	0.48	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
03/02/92	13	360	7.4	0.304	0.49	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
06/01/92	20	400	7.1	0.240	0.91	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-

ENTER CODE FOR CHOICE OF ACTIVITY W

DATE: 10/23/92
TIME: 13:08:14

COLUMBIA, TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: P48
SITE NO: POINT 49
SITE NAME: MIDDLE NO. 13 BASIN

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
09/11/89	26	470	7.9	0.260	1.39	0.004	< 0.010	< 0.010	< 5.0	0.002	-
12/04/89	8	395	7.6	0.311	0.67	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
03/12/90	19	364	7.1	0.260	1.68	< 0.003	0.020	< 0.010	< 5.0	0.002	-
06/01/90	22	350	7.1	0.245	0.82	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
09/10/90	27	340	7.4	0.213	1.61	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
12/03/90	8	380	7.4	0.305	1.05	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
03/18/91	13	330	7.1	0.272	1.48	0.006	< 0.010	< 0.010	< 5.0	0.002	-
06/03/91	23	625	6.6	0.308	1.49	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
09/09/91	25	580	8.8	0.113	7.63	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
12/09/91	14	300	7.2	0.512	0.95	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
03/02/92	13	260	7.2	0.287	0.81	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
06/01/92	21	400	7.2	0.250	1.35	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-

ENTER CODE FOR CHOICE OF ACTIVITY w

DATE: 10/23/92
TIME: 13:09:33

COLUMBIA TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: P4C
SITE NO: POINT 4C
SITE NAME: NORTH NO. 13 BASIN

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
09/11/89	26	470	7.7	0.200	1.41	< 0.003	< 0.010	< 0.010	< 5.0	0.003	-
12/04/89	8	403	8.0	0.320	0.54	< 0.003	< 0.010	< 0.010	< 5.0	0.003	-
03/12/90	19	370	7.2	0.280	0.52	0.006	0.020	< 0.010	< 5.0	0.003	-
06/01/90	21	360	7.0	0.256	0.48	< 0.003	0.043	< 0.010	< 5.0	0.130	-
09/10/90	26	350	7.1	0.247	3.11	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
12/03/90	8	360	7.8	0.311	1.27	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
03/18/91	12	340	7.2	49.900	0.82	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
06/03/91	22	690	6.5	0.331	0.53	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
09/09/91	25	500	8.0	0.293	0.85	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
12/09/91	15	300	7.0	0.389	0.44	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-
03/02/92	15	260	7.0	0.335	0.43	< 0.003	0.016	< 0.010	< 5.0	0.002	-
06/01/92	19	350	7.2	0.240	1.50	< 0.003	< 0.010	< 0.010	< 5.0	0.002	-

ENTER CODE FOR CHOICE OF ACTIVITY . W

DATE: 10/23/92
TIME: 13:10:41

COLUMBIA,TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: P5
SITE NO: POINT 5
SITE NAME: GREENLICK CREEK

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLT
03/23/87	0	0	8.1	0.800	0.65	* 0.000	* 0.000	* 0.000	0.0	0.020	-
06/08/87	23	437	7.8	0.950	1.36	* 0.000	* 0.000	* 0.000	0.0	0.022	-
09/01/87	22	390	7.8	0.740	2.05	* 0.000	* 0.000	* 0.000	0.0	0.012	-
12/07/87	10	599	8.1	0.220	1.33	< 0.050	< 0.040	< 0.050	5.0	0.021	-
03/07/88	13	434	7.6	0.293	0.49	< 0.050	< 0.040	< 0.050	5.0	0.003	-
06/06/88	28	490	8.1	0.120	1.21	< 0.050	< 0.040	< 0.050	5.0	0.026	-
09/06/88	24	450	7.7	14.370	2.07	< 0.050	< 0.040	< 0.040	5.0	0.004	-
12/05/88	10	527	7.8	0.225	0.95	< 0.003	< 0.010	< 0.010	5.0	0.003	-
03/06/89	14	360	8.1	2.390	0.55	0.003	< 0.010	< 0.010	5.0	0.003	-
06/12/89	22	324	7.6	0.300	0.86	< 0.003	< 0.010	< 0.010	5.0	0.004	-
09/11/89	25	496	7.6	0.280	1.58	< 0.006	< 0.010	< 0.010	5.0	0.003	-
12/04/89	11	510	6.5	0.104	0.53	< 0.003	< 0.010	< 0.010	5.0	0.002	-
03/12/90	17	341	7.6	0.290	0.51	0.005	0.020	< 0.010	5.0	0.003	-
06/01/90	20	360	7.2	0.289	0.70	< 0.003	< 0.010	< 0.010	5.0	0.025	-
09/10/90	23	400	7.0	0.280	1.58	< 0.003	< 0.010	< 0.010	5.0	0.022	-
12/03/90	8	390	6.0	0.306	0.58	< 0.003	< 0.010	0.010	6.9	0.002	-
03/18/91	14	340	7.2	0.869	0.59	< 0.003	< 0.010	< 0.010	5.0	0.002	-
06/03/91	20	505	7.2	0.319	0.55	< 0.003	< 0.010	< 0.010	5.0	0.002	-
09/09/91	27	760	7.2	0.306	1.43	< 0.003	< 0.010	< 0.010	5.5	0.002	-
12/09/91	14	310	7.0	0.392	0.53	< 0.003	< 0.010	< 0.010	5.0	0.002	-
03/02/92	17	240	7.4	0.343	0.55	< 0.003	< 0.010	< 0.010	5.0	0.002	-
06/01/92	19	410	7.2	0.280	0.96	< 0.003	< 0.010	< 0.010	5.0	0.002	-

ENTER CODE FOR CHOICE OF ACTIVITY

DATE: 10/23/92
TIME: 13:22:04

COLUMBIA,TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: 3-EAST
SITE NO: 03
SITE NAME: CLOSED PHOSPHORUS BARREL DUMP

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
03/23/87	15	668	7.0	0.350	0.20	< 0.050	* 0.000	* 0.000	< 5.0	0.640	585.7
06/08/87	18	7600	6.7	0.250	0.19	< 0.050	* 0.000	* 0.000	< 5.0 N	0.000	584.6
09/01/87	17	615	6.8	0.230	0.15	< 0.050	* 0.000	* 0.000	< 5.0	1.680	580.4
12/07/87	15	659	7.0	0.200	0.10	< 0.050	< 0.040	< 0.050	< 5.0	0.005	579.1
03/07/88	14	637	7.0	0.267	0.12	< 0.050	< 0.040	< 0.050	< 5.0	0.004	584.3
06/06/88	16	545	7.2	0.220	0.11	< 0.050	< 0.040	< 0.050	< 5.0	0.006	581.3
09/06/88	17	608	7.1	0.210	0.12	< 0.050	< 0.040	< 0.050	< 5.0	0.002	578.9
12/05/88	15	899	7.0	0.229	0.10	< 0.003	< 0.010	< 0.010	< 5.0	0.003	584.1
03/06/89	13	790	6.7	0.254	0.08	0.003	< 0.010	< 0.010	< 5.0	0.002	601.8
06/12/89	17	686	7.2	0.398	0.22	< 0.003	< 0.010	< 0.010	< 5.0	0.001	581.6
09/11/89	17	584	7.1	0.200	0.18	< 0.003	< 0.010	< 0.010	< 5.0	0.003	580.3
12/04/89	15	925	6.9	0.365	0.09	< 0.003	< 0.010	< 0.010	< 5.0	0.004	585.1
03/12/90	17	650	6.8	0.340	0.09	0.004	< 0.010	< 0.010	6.0	0.003	587.5
06/01/90	16	690	6.6	0.297	0.08	< 0.003	< 0.010	< 0.010	< 5.0	0.004	585.7
09/10/90	16	680	6.6	0.228	0.05	< 0.003	< 0.010	< 0.010	< 5.0	0.002	580.0
12/03/90	14	580	7.1	0.215	0.09	< 0.003	< 0.010	< 0.010	< 5.0	0.002	579.5
03/18/91	14	680	6.6	0.250	0.08	< 0.003	< 0.010	< 0.010	6.6	0.002	587.9
06/03/91	18	800	6.8	0.317	0.06	0.006	< 0.010	< 0.010	6.7	0.002	593.3
09/09/91	20	640	6.2	0.329	0.06	< 0.003	< 0.010	< 0.010	< 5.0	0.002	580.3
12/09/91	15	590	6.8	0.273	0.07	< 0.003	< 0.010	< 0.010	5.2	0.002	590.6
03/02/92	10	580	6.8	0.253	0.08	0.004	< 0.010	< 0.010	< 5.0	0.002	594.0
06/01/92	15	730	6.6	0.200	0.07	< 0.003	< 0.010	< 0.010	< 5.0	0.002	581.7

ENTER CODE FOR CHOICE OF ACTIVITY w

DATE: 10/23/92
TIME: 12:24:10

COLUMBIA,TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: 4-5
SITE NO: 04
SITE NAME: PHOSPHORUS SLURRY DUMP

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
03/23/87	16	905	6.8	0.030	1.22	< 0.050	< 0.040 *	0.000 *	0.0	0.008	648.4
06/08/87	19	529	7.2 <	0.025	1.14	< 0.050	< 0.040 *	0.000 *	0.0 N	0.000	649.5
09/01/87	17	895	7.2 <	0.025	1.30	< 0.050	< 0.040 *	0.000 *	0.0	0.002	647.6
12/07/87	16	1106	7.0 <	0.025	1.19	< 0.050	< 0.040	< 0.050	< 5.0	0.005	647.6
03/07/88	16	1330	6.8 <	0.025	1.06	< 0.050	< 0.040	< 0.050	< 5.0	0.003	647.7
06/06/88	19	872	7.3	0.026	1.23	< 0.050	< 0.040	< 0.050	< 5.0	0.009	647.6
09/06/88	17	844	6.5 <	0.025	1.13	< 0.050	< 0.040	< 0.050	< 5.0	0.002	647.6
12/05/88	15	1278	6.9 <	0.025	0.98	< 0.003	< 0.010	< 0.010	< 5.0	0.002	647.6
03/06/89	11	2540	7.5	0.069	1.00	< 0.003	< 0.010	< 0.010	< 5.0	0.003	653.2
06/12/89	16	1013	7.0	0.053	0.87	< 0.003	0.010	< 0.010	< 5.0	0.002	647.9
09/11/89	17	965	6.9 <	0.025	1.30	< 0.003	< 0.010	< 0.010	< 5.0	0.002	647.8
12/04/89	16	1112	7.1 <	0.025	1.19	< 0.003	< 0.010	< 0.010	< 5.0	0.003	646.6
03/12/90	18	1270	6.8 <	0.025	1.49	0.009	0.010	< 0.010	< 5.0	0.002	647.8
06/01/90	16	1000	6.7	0.003	1.13	< 0.003	0.011	< 0.010	< 5.0	0.003	647.8
09/10/90	18	920	6.6 <	0.025	1.08	< 0.003	< 0.010	< 0.010	< 5.0	0.002	647.8
12/03/90	15	1100	6.8 <	0.025	1.09	< 0.003	< 0.010	< 0.010	< 5.0	0.002	647.9
03/13/91	16	1200	6.9 <	0.025	1.54	< 0.003	< 0.010	< 0.010	8.4	0.002	647.7
06/03/91	18	1300	6.3	0.049	0.96	0.006	< 0.010	< 0.010	< 5.0	0.021	647.3
09/09/91	19	1950	6.6 <	0.025	1.36	0.004	< 0.010	< 0.010	< 5.0	0.002	647.4
12/09/91	16	1100	6.5	0.103	1.32	< 0.003	< 0.010	< 0.010	< 5.0	0.002	652.5
03/02/92	17	1100	6.7 <	0.025	1.58	0.005	< 0.010	< 0.010	< 5.0	0.002	647.6
06/01/92	18	1000	6.2 <	0.025	1.57	< 0.003	< 0.010	< 0.010	< 5.0	0.002	647.7

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DATE: 10/23/92
TIME: 12:36:43

COLUMBIA,TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: 4-6
SITE NO: 04
SITE NAME: PHOSPHORUS SLURRY DUMP

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
03/23/87	20	2960	6.9	0.000	0.00	* 0.000	* 0.000	* 0.000	* 0.0 *	0.000	634.6
06/08/87	23	3930	7.0	0.000	0.00	* 0.000	* 0.000	* 0.000	* 0.0 *	0.000	635.3
09/01/87	16	2350	7.0	0.000	0.00	* 0.000	* 0.000	* 0.000	* 0.0 *	0.000	634.0
12/07/87	16	2590	7.1	6.000	0.60	< 0.050	< 0.040	< 0.050	62.0	0.008	634.3
03/07/88	16	2220	7.1	24.250	0.68	< 0.050	< 0.040	< 0.050	6.0	0.003	634.2
06/06/88	18	2110	7.3	12.900	0.98	< 0.050	< 0.040	< 0.050	< 5.0	0.008	634.2
09/06/88	18	2250	6.9	6.140	0.72	< 0.050	< 0.040	< 0.050	90.2	0.002	634.
12/05/88	16	3290	7.1	11.950	0.69	0.004	< 0.010	0.034	96.0	0.002	634.3
03/06/89	13	2530	7.3	41.900	0.60	< 0.003	< 0.010	0.054	6.5	0.003	635.1
06/12/89	18	1965	6.9	23.400	0.66	0.004	< 0.010	0.051	6.0	0.026	634.4
09/11/89	19	2170	6.9	28.200	0.86	0.004	< 0.010	< 0.010	6.0	0.020	635.6
12/04/89	16	2360	7.2	55.800	0.68	< 0.003	< 0.010	< 0.010	< 5.0	0.003	634.3
03/12/90	18	1820	6.4	63.400	0.51	0.005	< 0.010	0.010	8.0	0.003	634.4
06/01/90	17	1800	6.4	48.150	0.49	< 0.003	< 0.010	0.030	< 5.0	0.004	634.3
09/10/90	17	2000	6.4	29.500	0.32	< 0.003	< 0.010	0.030	< 5.0	0.002	634.5
12/03/90	15	2700	6.5	88.900	0.40	< 0.003	< 0.010	0.030	6.0	0.013	634.6
03/18/91	15	1500	6.4	74.500	0.32	< 0.003	< 0.010	0.080	9.2	0.002	634.4
06/03/91	18	1200	6.4	83.400	0.43	< 0.003	< 0.010	0.077	5.0	0.002	634.5
09/09/91	18	2000	6.4	25.400	0.22	0.005	< 0.010	0.043	< 5.0	0.002	634.2
12/09/91	14	1200	6.4	77.600	0.55	< 0.003	< 0.010	0.061	7.9	0.002	634.3
03/02/92	16	1000	6.0	110.299	0.32	< 0.003	< 0.010	0.088	< 5.0	0.002	634.2
06/01/92	17	1400	6.6	38.900	0.17	0.003	< 0.010	0.042	< 5.0	0.004	635.6

ENTER CODE FOR CHOICE OF ACTIVITY w

DATE: 10/23/92
TIME: 12:29:31

COLUMBIA,TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: 4-7
SITE NO: 04
SITE NAME: PHOSPHORUS SLURRY DUMP

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB		P4 PPB	ELEV SLF
03/23/87	15	405	5.9	45.000	0.53	< 0.050	< 0.040	* 0.000	* 0.0		0.008	633.0
06/08/87	22	4640	6.0	55.360	0.58	< 0.050	< 0.040	* 0.000	* 0.0	N	0.000	632.6
09/01/87	17	762	6.8	16.500	0.49	< 0.050	< 0.040	* 0.000	* 0.0		0.004	632.6
12/07/87	15	314	6.3	50.000	0.52	< 0.050	< 0.040	< 0.050	< 5.0		0.003	632.7
03/07/88	15	540	5.9	33.500	0.51	< 0.050	< 0.040	< 0.050	< 5.0		0.002	632.9
06/06/88	18	524	6.9	16.700	0.74	< 0.050	< 0.040	< 0.050	< 5.0		0.008	632.6
09/06/88	----------					WELL DRY	----------					
12/05/88	----------					WELL DRY	----------					
03/06/89	13	412	6.1	8.700	0.31	< 0.003	< 0.010	< 0.010	< 5.0		0.005	636.7
06/12/89	----------					WELL DRY	----------					
09/11/89	17	430	6.0	30.530	0.64	< 0.003	< 0.010	< 0.010	< 5.0		0.120	632.5
12/04/89	----------					WELL DRY	----------					
03/12/90	----------					WELL DRY	----------					
06/01/90	----------					WELL DRY	----------					
09/10/90	----------					WELL DRY	----------					
12/03/90	----------					WELL DRY	----------					
03/18/91	----------					WELL DRY	----------					
06/03/91	----------					WELL DRY	----------					
09/09/91	----------					WELL DRY	----------					
12/09/91	15	2100	6.0	8.910	0.29	< 0.003	< 0.010	< 0.010	< 5.0		0.002	640.0
03/02/92	----------					WELL DRY	----------					
06/01/92	----------					WELL DRY	----------					

To be abandoned

ENTER CODE FOR CHOICE OF ACTIVITY · 9

DATE: 10/23/92
TIME: 12:51:22

COLUMBIA,TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 12/19/91

WELL NO: 4-6
SITE NO: 04
SITE NAME: PHOSPHORUS SLURRY DUMP

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
03/23/87	15	476	6.3	1.050	0.40	< 0.050	< 0.040 *	0.000 *	0.0 N	0.000	575.2
06/08/87	WELL DRY										
09/01/87	17	519	6.0	2.400	0.34	< 0.050	< 0.040 *	0.000 *	0.0	0.002	585.6
12/07/87	14	670	6.9	0.460	0.43	< 0.050	< 0.040	< 0.050	< 5.0	0.003	584.7
03/07/88	15	463	6.2	1.100	0.38	< 0.050	< 0.040	< 0.050	< 5.0	0.002	585.6
06/06/88	WELL DRY										
09/06/88	WELL DRY										
12/05/88	WELL DRY										
03/06/89	12	488	6.3	0.804	0.52	< 0.003	< 0.010	< 0.010	< 5.0	0.004	598.6
06/12/89	WELL DRY										
09/11/89	WELL DRY										
12/04/89	WELL DRY										
03/12/90	WELL DRY										
06/01/90	WELL DRY										
09/10/90	WELL DRY										
12/03/90	WELL DRY										
03/18/91	WELL DRY										
06/03/91	WELL DRY										
09/09/91	WELL DRY										
12/09/91	WELL DRY										

To be abandoned

ENTER CODE FOR CHOICE OF ACTIVITY w

DATE: 10/23/92
TIME: 13:41:32

COLUMBIA,TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: B-15
SITE NO: 05
SITE NAME: CLOSED SOLID/SANITARY WASTE DUMP

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
03/23/87	14	872	6.8	0.100	0.29	< 0.050	< 0.040 *	0.000 *	0.0	0.025	537.3
06/08/87	19	693	7.0	0.230	0.28	< 0.050	< 0.040 *	0.000 *	0.0	0.005	536.5
09/01/87	19	733	6.9	0.350	0.23	0.130	< 0.040 *	0.000 *	0.0	0.160	536
12/07/87	16	963	6.8	0.190	0.23	< 0.050	< 0.040	< 0.050	< 5.0	0.006	536.5
03/07/88	16	928	6.7	0.234	0.26	< 0.050	< 0.040	< 0.050	< 5.0	0.002	537.1
06/06/88	18	730	7.1	0.269	0.28	< 0.050	< 0.040	< 0.050	< 5.0	0.110	535.9
09/06/88	18	775	6.5	0.260	0.30	< 0.050	< 0.040	< 0.050	< 5.0	0.004	536.9
12/05/88	15	1291	6.8	0.350	0.32	< 0.003	< 0.010	< 0.010	< 5.0	0.003	537.8
03/06/89	17	1100	7.0	0.189	0.65	< 0.003	0.010	0.010	5.0	0.340	544.1
06/12/89	17	757	6.9	0.377	0.07	< 0.003	< 0.010	< 0.010	< 5.0	0.002	537.7
09/11/89	17	730	6.8	0.310	0.28	< 0.007	< 0.010	< 0.010	< 5.0	0.205	537.0
12/04/89	15	952	6.8	0.366	0.34	< 0.003	< 0.010	< 0.010	< 5.0	0.002	537.8
03/12/90	18	742	6.5	0.320	0.34	< 0.003	< 0.010	< 0.010	< 5.0	0.082	538.1
06/01/90	17	900	6.5	0.256	0.25	< 0.003	< 0.010	< 0.010	< 5.0	0.016	536.7
09/10/90	17	720	6.6	0.310	0.19	< 0.003	< 0.010	< 0.010	< 5.0	0.140	535.7
12/03/90	15	680	6.6	0.302	0.33	< 0.003	< 0.010	< 0.010	< 5.0	0.002	539.3
03/18/91	16	660	6.6	0.281	0.48	0.011	< 0.010	< 0.010	< 5.0	0.007	537.0
06/03/91	17	1000	6.8	0.341	0.30	< 0.003	< 0.010	< 0.010	< 5.0	0.002	537.9
09/09/91	20	1000	6.2	0.320	0.19	< 0.003	< 0.010	< 0.010	< 5.0	0.002	535.0
12/09/91	17	290	6.5	0.389	0.34	< 0.003	< 0.010	< 0.010	< 5.0	0.002	543.3
03/02/92	17	600	6.6	0.330	0.34	< 0.003	< 0.010	< 0.010	< 5.0	0.002	521.6
06/01/92	17	800	6.4	0.310	0.22	< 0.003	< 0.010	< 0.010	< 5.0	0.002	537.2

ENTER CODE FOR CHOICE OF ACTIVITY w

DATE: 10/23/92
TIME: 12:43:40

COLUMBIA, TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: B-16
SITE NO: 05
SITE NAME: CLOSED SOLID/SANITARY WASTE DUMP

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB		P4 PPB	ELEV SLF
03/23/87	13	635	5.5	0.070	2.11	< 0.050	< 0.040	* 0.000	* 0.0		0.011	529.9
06/08/87	21	543	7.4	0.030	2.36	< 0.050	< 0.040	* 0.000	* 0.0	N	0.000	524.8
09/01/87	19	520	7.6	0.060	2.94	< 0.050	< 0.040	* 0.000	* 0.0		0.010	525.6
12/07/87	16	818	7.2	0.070	2.30	< 0.050	< 0.040	< 0.050	< 5.0		0.003	524.9
03/07/88	16	637	7.3	0.048	2.92	< 0.050	< 0.040	< 0.050	< 5.0		0.002	527.7
06/06/88	18	520	7.6	0.048	2.58	< 0.050	< 0.040	< 0.050	< 5.0		0.008	524.9
09/06/88	19	606	7.7	0.060	2.85	< 0.050	< 0.040	< 0.050	< 5.0		0.105	524.9
12/05/88	16	752	7.8	0.043	2.64	< 0.003	< 0.010	< 0.010	< 5.0		0.012	526.6
03/06/89	16	1100	7.5	0.193	1.25	0.004	< 0.010	< 0.010	< 5.0		0.097	539.0
06/12/89	17	735	6.9	0.199	2.39	< 0.003	< 0.010	< 0.010	< 5.0		0.005	531.
09/11/89	18	889	7.3	0.320	1.74	< 0.003	< 0.010	< 0.010	< 5.0		0.040	528.0
12/04/89	16	1178	7.3	0.384	1.71	< 0.003	< 0.010	< 0.010	< 5.0		0.400	527.9
03/12/90	19	761	7.0	0.204	2.16	< 0.003	< 0.010	< 0.010	< 5.0		0.185	530.9
06/01/90	18	660	6.9	0.227	2.01	< 0.003	< 0.010	< 0.010	< 5.0		0.011	526.6
09/10/90	16	810	6.4	0.400	1.49	< 0.003	< 0.010	< 0.010	< 5.0		0.135	524.7
12/03/90	15	810	6.8	0.279	1.48	< 0.003	< 0.010	< 0.010	< 5.0		0.002	538.5
03/18/91	16	700	6.6	0.311	1.59	< 0.003	< 0.010	< 0.010	< 5.0		0.005	526.7
06/03/91	17	640	6.6	0.246	1.91	< 0.003	< 0.010	< 0.010	< 5.0		0.002	529.2
09/09/91	21	340	6.9	0.282	2.25	< 0.003	< 0.010	< 0.010	< 5.0		0.002	524.8
12/09/91	17	680	7.2	0.288	2.38	< 0.003	< 0.010	< 0.010	< 5.0		0.002	541.6
03/02/92	15	495	7.1	0.199	2.24	< 0.003	< 0.010	< 0.010	< 5.0		0.002	534.7
06/01/92	17	600	6.4	0.310	2.22	0.008	< 0.010	< 0.010	< 5.0		0.002	529.0

ENTER CODE FOR CHOICE OF ACTIVITY *

DATE: 10/23/92
TIME: 12:32:39

COLUMBIA.TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: 12-1
SITE NO: 12
SITE NAME: TANK FARM

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
03/23/87	20	1104	7.0	3.900	0.27	< 0.050	< 0.040	* 0.000 *	0.0	8.008	585.9
06/08/87	22	580	6.0	2.500	0.58	< 0.050	< 0.040	* 0.000 *	0.0	44.000	586.1
09/01/87	24	939	7.2	2.940	0.98	< 0.050	< 0.040	* 0.000 *	0.0	1.480	585.
12/07/87	10	1096	7.4	0.950	0.49	< 0.050	< 0.040	< 0.050	6.0	33.000	586.2
03/07/88	19	1015	7.2	4.200	0.44	< 0.050	< 0.040	< 0.050	8.0	184.000	585.1
06/06/88	19	647	7.0	16.400	0.08	< 0.050	< 0.040	< 0.050	12.0	65.000	580.3
09/06/88	31	1640	9.3	0.040	3.23	< 0.050	2.340	< 0.050 <	5.0	0.008	577.5
12/05/88	12	514	7.6	0.075	0.19	0.003	< 0.010	< 0.010 <	5.0	6.400	590.1
03/06/89	13	726	7.2 <	0.025	0.26	< 0.003	< 0.010	< 0.010 <	5.0	0.003	581.2
06/12/89	20	3140	7.0	0.080	0.19	< 0.003	< 0.010	< 0.010 <	5.0	0.280	591.1
09/11/89	24	630	7.1	0.060	0.35	< 0.003	< 0.010	< 0.010	11.0	0.004	590.8
12/04/89	15	605	7.4	0.034	0.27	< 0.003	< 0.010	< 0.010	10.0	0.510	591.0
03/12/90	18	1257	7.1	1.600	3.02	< 0.003	< 0.010	< 0.010	8.0	0.365	590.1
06/01/90	20	2800	6.8	0.663	1.88	< 0.003	< 0.010	< 0.010	7.0	0.660	590.3
09/10/90	20	2700	6.9	0.610	1.06	< 0.003	< 0.010	< 0.010 <	5.0	0.310	589.5
12/03/90	19	780	6.4	3.910	1.11	< 0.003	< 0.010	< 0.010	5.1	0.320	591.3
03/18/91	20	300	7.0	47.800	1.84	< 0.003	< 0.010	< 0.010 <	5.0	0.030	589.8
06/03/91	20	200	6.5	3.770	1.27	< 0.003	< 0.010	< 0.010	3.9	0.016	585.3
09/09/91	22	2700	7.1	2.880	0.07	< 0.003	< 0.010	< 0.010 <	5.0	15.000	583.2
12/09/91	19	720	7.0	2.800	0.17	< 0.003	< 0.010	< 0.010	8.2	27.000	591.8
03/02/92	19	2120	6.5	7.575	1.46	< 0.003	< 0.010	< 0.010 <	5.0	0.200	589.8
06/01/92	19	3200	6.5	1.270	1.20	< 0.003	< 0.010	< 0.010 <	5.0	0.047	591.1

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DATE: 10/23/92
TIME: 12:36:06

COLUMBIA,TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: 12-2
SITE NO: 12
SITE NAME: TANK FARM

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
03/23/87	18	1294	6.8	34.000	0.96	< 0.050	< 0.040	* 0.000 *	0.0	33.500	593.6
06/08/87	21	551	6.3	54.500	1.90	< 0.050	< 0.040	* 0.000 *	0.0	1390.00	594.2
09/01/87	22	643	6.8	51.800	2.15	< 0.050	< 0.040	* 0.000 *	0.0	1.480	593.5
12/07/87	16	374	7.0	55.000	2.00	< 0.050	< 0.040	< 0.050	11.0	1305.00	593.6
03/07/88	15	646	6.7	49.900	2.11	< 0.050	< 0.040	< 0.050	8.0	1340.00	593.6
06/06/88	21	493	6.7	63.600	1.94	< 0.050	< 0.040	< 0.050	10.0	10.300	593.5
09/06/88	19	1900	7.1	7.280	0.14	< 0.050	1.690	< 0.050	6.0	194.000	592.8
12/05/88	17	863	6.9	45.980	2.24	< 0.003	< 0.010	< 0.010	6.6	1030.00	593.5
03/06/89	11	636	7.0	50.700	2.40	< 0.003	< 0.010	< 0.010	5.0	1200.00	594.0
06/12/89	19	485	6.8	39.100	2.33	< 0.003	< 0.010	< 0.010	7.0	680.000	593.9
09/11/89	20	915	6.6	34.090	2.11	< 0.003	< 0.010	< 0.010	7.0	625.000	593.9
12/04/89	18	822	7.0	45.700	2.09	< 0.003	< 0.010	< 0.010	< 5.0	910.000	593.8
03/12/90	18	634	6.6	44.900	2.18	< 0.003	< 0.010	< 0.010	10.0	1080.00	594.0
06/01/90	18	400	6.2	46.900	2.39	< 0.003	< 0.010	< 0.010	9.0	1440.00	593.8
09/10/90	20	1600	6.4	14.000	0.22	< 0.003	< 0.010	< 0.010	7.0	275.000	593.6
12/03/90	19	1400	6.4	30.400	0.91	< 0.003	< 0.010	< 0.010	8.8	350.000	594.1
03/18/91	19	1500	6.4	12.700	2.32	< 0.003	< 0.010	< 0.010	< 5.0	310.000	593.3
06/03/91	19	2100	6.4	40.000	0.67	< 0.003	< 0.010	< 0.010	6.3	405.000	592.2
09/09/91	25	1020	6.2	39.100	0.37	< 0.003	< 0.010	< 0.010	< 5.0	600.000	592.6
12/09/91	19	1800	6.4	39.300	0.21	< 0.003	< 0.010	< 0.010	6.2	80.000	592.7
03/02/92	18	1900	6.4	9.453	0.10	< 0.003	< 0.010	< 0.010	< 5.0	234.000	592.6
06/01/92	19	1900	6.5	11.600	0.07	< 0.003	< 0.010	< 0.010	< 5.0	450.000	592.6

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DATE: 10/23/92
TIME: 12:39:17

COLUMBIA,TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: 12-4
SITE NO: 12
SITE NAME: TANK FARM

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
03/23/87	17	927	6.1	0.030	1.68	< 0.050	< 0.040 *	0.000 *	0.0	0.180	592.2
06/08/87	23	745	6.5	54.600	2.87	< 0.050	< 0.040 *	0.000 *	0.0	2.800	592.1
09/01/87	27	912	6.7	57.200	2.62	< 0.050	< 0.040 *	0.000 *	0.0	0.015	592.8
12/07/87	15	670	7.3	0.140	0.44	< 0.050	< 0.040	< 0.050	< 5.0	2.200	593.5
03/07/88	12	438	7.5	0.051	0.33	< 0.050	< 0.040	< 0.050	< 5.0	8.100	593.6
06/06/88	17	351	7.2	0.096	0.34	< 0.050	< 0.040	< 0.050	< 5.0	0.064	593.2
09/06/88	25	340	7.2	0.070	0.27	< 0.050	< 0.040	< 0.050	< 5.0	0.005	592.0
12/05/88	17	3450	12.5 <	0.025	0.40	< 0.003	< 0.010	< 0.010	< 5.0	0.020	576.2
03/06/89	21	1600	11.5	0.033	0.40	< 0.003	< 0.010	< 0.010	< 5.0	2.150	578.8
06/12/89	21	924	9.6	0.262	1.62	< 0.003	< 0.010	< 0.010	< 5.0	22.400	575.7
09/11/89	21	980	8.9	0.520	0.70	< 0.003	< 0.010	< 0.010	5.0	80.000	582.7
12/04/89	21	1334	7.9	1.220	0.23	< 0.003	< 0.010	< 0.010	< 5.0	115.000	584.0
03/12/90	22	885	8.1	1.600	0.41	< 0.003	< 0.010	< 0.010	< 5.0	185.000	585.6
06/01/90	20	900	6.4	7.730	0.11	< 0.003	< 0.010	< 0.010	< 5.0	265.000	583.6
09/10/90	21	1100	7.1	1.390	0.07	< 0.003	< 0.010	< 0.010	< 5.0	180.000	583.0
12/03/90	20	1200	7.0	0.950	0.22	< 0.003	< 0.010	< 0.010	< 5.0	90.000	587.2
03/18/91	20	780	7.0	0.510	0.08	< 0.003	< 0.010	< 0.010	11.5	82.000	586.6
06/03/91	21	1100	7.0	7.830	0.07	< 0.003	< 0.010	< 0.010	< 5.0	15.000	586.6
09/09/91	23	3200	6.8	0.741	1.28	< 0.003	< 0.010	< 0.010	< 5.0	0.002	593.2
12/09/91	19	2600	6.8	3.630	1.33	< 0.003	< 0.010	< 0.010	6.9	0.003	593.0
03/02/92	20	580	6.9	6.597	0.04	< 0.003	< 0.010	< 0.010	6.8	204.000	589.3
06/01/92	20	1500	6.6	12.000	0.05	< 0.003	< 0.010	< 0.010	6.9	219.000	582.2

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DATE: 10/23/92
TIME: 12:43:36

COLUMBIA,TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: 17-5
SITE NO: 17
SITE NAME: FURNACE DEPARTMENT

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
03/23/87	17	693	5.6	42.000	22.50	< 0.050	< 0.040	* 0.000 *	0.0	10.000	583.9
06/08/87	21	546	6.0	30.300	23.00	< 0.050	< 0.040	* 0.000 *	0.0	34.000	583.2
09/01/87	24	622	6.3	20.500	26.50	< 0.050	< 0.040	* 0.000 *	0.0	0.025	583.
12/07/87	16	1040	6.1	22.000	29.80	< 0.050	< 0.040	< 0.050	30.0	66.000	584.7
03/07/88	15	719	5.8 <	17.400	28.00	< 0.050	< 0.040	< 0.050	21.0	68.000	584.9
06/06/88	20	529	6.5	0.515	24.20	< 0.050	< 0.040	< 0.050	41.0	1.320	583.1
09/06/88	25	676	6.1	16.010	30.60	< 0.050	< 0.040	< 0.050	50.0	0.960	584.6
12/05/88	18	1072	6.2	20.340	23.30	0.005	< 0.010	0.013	40.0	100.000	584.9
03/06/89	15	930	6.0	0.246	35.40	< 0.003	< 0.010	0.010	41.3	0.900	586.7
06/12/89	21	637	6.0	12.300	30.10	< 0.003	< 0.010	< 0.010	23.2	18.400	584.8
09/11/89	24	655	6.0	11.370	26.08	< 0.003	< 0.010	< 0.010	34.0	6.900	585.1
12/04/89	18	608	6.2	21.300	28.33	0.003	< 0.010	< 0.010	24.2	110.000	585.8
03/12/90	20	482	6.0	18.000	33.80	< 0.003	< 0.010	< 0.010	174.0	50.000	585.3
06/01/90	21	420	5.8	16.410	27.00	< 0.003	< 0.010	< 0.010	192.0	60.000	585.3
09/10/90	23	660	4.0	11.000	43.40	< 0.003	< 0.010	< 0.010	56.0	36.800	584.0
12/03/90	22	600	6.0	1.310	25.70	< 0.003	< 0.010	< 0.010	71.8	112.000	585.9
03/18/91	19	420	6.0	16.200	32.90	< 0.003	< 0.010	< 0.010	286.0	790.000	585.3
06/03/91	18	860	6.0	17.200	23.80	< 0.003	< 0.010	< 0.010	8.2	60.100	586.6
09/09/91	22	480	6.2	9.690	29.50	< 0.003	< 0.010	< 0.010	334.0	8.600	585.7
12/09/91	19	720	5.1	44.900	56.60	< 0.003	< 0.010	< 0.010	19.7	0.195	599.7
03/02/92	19	300	5.9	13.432	28.00	< 0.003	< 0.010	< 0.010	0.0	13.000	586.6
06/01/92	18	3800	6.5	7.290	26.20	< 0.003	< 0.010	< 0.010 <	5.0	680.000	586.3

ENTER CODE FOR CHOICE OF ACTIVITY

DATE: 10/23/92
TIME: 12:47:45

COLUMBIA,TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: 19-1
SITE NO: 19
SITE NAME: FURNACE RAILROAD YARD

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
03/23/87	20	473	7.5	0.030	11.10	< 0.050	< 0.040 *	0.000 *	0.0	0.180	570.0
06/08/87	20	4320	7.6	0.050	10.28	< 0.050	< 0.040 *	0.000 *	0.0 N	0.000	570.6
09/01/87	25	464	8.0	0.070	13.10	< 0.050	< 0.040 *	0.000 *	0.0	1.680	570.0
12/07/87	20	758	7.7	0.050	13.40	< 0.050	< 0.040	< 0.050	10.0	0.004	570.9
03/07/88	18	556	7.6 <	0.025	11.55	< 0.050	< 0.040	< 0.050	6.0	0.003	570.9
06/06/88	19	427	8.0	0.041	12.80	< 0.050	< 0.040	< 0.050	14.0	0.010	570.0
09/06/88	21	420	7.3 <	0.025	11.90	< 0.050	< 0.040	< 0.050	10.0	0.004	570.9
12/05/88	16	590	7.9	0.240	12.80	< 0.003	< 0.010	< 0.010	7.6	24.800	571.2
03/06/89	18	648	8.4 <	0.025	13.30	< 0.003	< 0.010	< 0.010 <	5.0	0.016	572.2
06/12/89	19	342	7.1	0.052	13.60	< 0.003	< 0.010	< 0.010 <	5.0	0.038	571.6
09/11/89	19	494	7.4 <	0.025	11.20	< 0.003	< 0.010	< 0.010 <	5.0	0.002	571.5
12/04/89	18	537	7.5	0.024	10.93	< 0.003	< 0.010	< 0.010	9.0	0.690	570.8
03/12/90	19	337	7.3	0.052	13.50	< 0.003	0.010	< 0.010	6.0	0.370	571.5
06/01/90	19	340	6.7	0.033	11.07	< 0.003	< 0.010	< 0.010 <	5.0	0.006	568.9
09/10/90	20	400	7.2	0.025	9.98	< 0.003	< 0.010	< 0.010	6.0	0.021	567.5
12/03/90	18	360	6.8	0.054	9.52	< 0.003	< 0.010	< 0.010	8.0	0.002	568.4
03/18/91	19	400	7.0	0.047	10.40	< 0.003	< 0.010	< 0.010 <	5.0	0.078	568.4
06/03/91	19	480	7.4	0.091	11.70	< 0.003	< 0.010	< 0.010	8.0	0.002	569.0
09/09/91	21	480	7.3	0.034	10.20	< 0.003	< 0.010	< 0.010 <	5.0	0.002	567.9
12/09/91	18	320	7.4	0.063	12.20	< 0.003	< 0.010	< 0.010	6.4	0.002	569.0
03/02/92	18	605	6.1	0.043	11.71	< 0.003	< 0.010	< 0.010	5.0	0.000	566.8
06/01/92	18	440	7.0	0.040	13.20	< 0.003	< 0.010	< 0.010 <	5.0	0.002	568.7

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DATE: 10/23/92
TIME: 13:49:42

COLUMBIA, TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: 19-3
SITE NO: 19
SITE NAME: FURNACE RAILROAD YARD

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB		P4 PPB	ELEV SLF
03/23/87	17	1153	7.5	0.840	11.91	< 0.050	< 0.040	* 0.000 *	0.0		0.008	572.4
06/08/87	20	11	8.5	0.080	13.92	< 0.050	< 0.040	* 0.000 *	0.0	N	0.000	571.4
09/01/87	25	1214	8.9	0.050	17.90	< 0.050	< 0.040	* 0.000 *	0.0		1.500	571.1
12/07/87	18	1050	8.9	0.060	14.30	< 0.050	< 0.040	< 0.050	30.0		0.068	571.5
03/07/88	15	1006	8.0	0.060	11.30	< 0.050	< 0.040	0.100	34.0		0.032	571.7
06/06/88	17	735	8.5	0.051	14.40	< 0.050	< 0.040	< 0.050	84.0		0.110	571.3
09/06/88	23	1100	11.7	0.100	15.00	< 0.050	< 0.040	< 0.050	35.0		0.004	572.2
12/05/88	16	2070	7.4	0.192	7.70	< 0.003	< 0.010	0.016	88.0		0.008	572.3
03/06/89	11	1238	8.0	0.444	8.80	< 0.003	< 0.010	< 0.010	8.6		0.120	573.6
06/12/89	17	807	7.9	0.157	12.00	< 0.003	< 0.010	0.013	19.2		0.105	572.8
09/11/89	22	689	8.1	0.110	13.25	< 0.003	< 0.010	< 0.010	10.0		0.110	572.7
12/04/89	20	635	7.7	0.034	13.02	< 0.003	< 0.010	< 0.010	25.0		0.690	572.2
03/12/90	18	454	7.6	0.121	1.73	< 0.003	0.010	< 0.010	21.0		0.560	572.8
06/01/90	16	480	8.2	0.036	12.69	< 0.003	< 0.010	0.020	27.0		0.230	571.9
09/10/90	21	560	8.0	0.030	12.70	< 0.003	< 0.010	0.020	35.0		0.006	569.4
12/03/90	19	580	7.0	0.071	12.70	< 0.003	< 0.010	0.020	47.0		0.002	570.0
03/18/91	19	620	7.4	0.074	11.70	< 0.003	< 0.010	0.020	43.2		0.002	569.3
06/03/91	19	700	7.2	0.293	8.94	< 0.003	< 0.010	0.019	5.0		0.002	571.1
09/09/91	22	890	8.5	0.095	13.00	< 0.003	< 0.010	0.025	37.5		0.002	569.3
12/09/91	20	420	8.3	0.203	12.20	< 0.003	0.011	0.015	28.9		0.002	570.1
03/02/92	18	590	8.4	0.076	13.83	< 0.003	< 0.010	0.030	38.0		0.002	569.7
06/01/92	18	640	8.6	0.100	16.70	< 0.003	< 0.010	0.023	28.6		0.002	569.3

ENTER CODE FOR CHOICE OF ACTIVITY

DATE: 10/23/92
TIME: 12:52:28

COLUMBIA,TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: 19--
SITE NO: 19
SITE NAME: FURNACE RAILROAD YARD

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
03/23/87	20	2010	7.1	2.200	2.17	< 0.050	< 0.040 *	0.000 *	0.0	0.005	573.3
06/08/87	24	1186	9.5	2.000	2.86	< 0.050	< 0.040 *	0.000 *	0.0 N	0.000	566.8
09/01/87	23	1219	7.2	0.140	3.39	< 0.050	< 0.040 *	0.000 *	0.0	1.500	566.1
12/07/87	19	2160	7.5	0.660	2.40	< 0.050	< 0.040	< 0.050	49.0	0.110	566.7
03/07/88	15	1378	7.0	0.442	10.93	< 0.050	< 0.040	0.100	34.0	0.240	569.6
06/06/88	22	920	7.0	0.800	2.30	< 0.050	< 0.040	< 0.050	52.0	14.400	566.1
09/06/88	21	1129	7.0	0.280	3.70	< 0.050	< 0.040	< 0.050	33.0	0.010	566.6
12/05/88	18	1847	7.4	3.050	3.75	< 0.003	< 0.010	0.016	65.0	0.003	568.4
03/06/89	16	1410	7.3	23.700	1.57	< 0.003	< 0.010	0.011	28.8	19.200	572.1
06/12/89	20	869	6.9	8.510	3.31	0.003	< 0.010	0.014	33.2	1.350	569.7
09/11/89	20	921	7.0	0.300	5.40	< 0.003	< 0.010	< 0.010	28.0	0.004	568.2
12/04/89	20	1475	7.1	0.074	4.35	< 0.003	< 0.010	< 0.010	68.0	0.043	567.3
03/12/90	20	1314	6.9	0.060	5.00	< 0.003	< 0.010	< 0.010	< 5.0	0.440	567.5
06/01/90	20	990	6.6	0.052	4.73	< 0.003	< 0.010	< 0.010	46.0	0.006	566.6
09/10/90	22	2100	6.2	0.090	4.45	< 0.003	< 0.010	< 0.010	64.0	0.030	562.9
12/03/90	18	2100	6.5	0.109	1.54	< 0.003	< 0.010	< 0.010	100.0	0.010	563.5
03/18/91	20	1100	6.8	0.081	4.45	< 0.003	< 0.010	< 0.010	40.2	0.002	563.9
06/03/91	21	2000	7.0	0.056	2.21	< 0.003	< 0.010	< 0.010	92.0	0.005	560.4
09/09/91	25	2900	6.5	0.117	1.86	< 0.003	< 0.010	< 0.010	45.5	0.002	563.0
12/09/91	20	1000	7.0	0.202	3.68	< 0.003	< 0.010	< 0.010	35.4	0.007	567.1
03/02/92	20	1800	6.8	0.115	1.50	< 0.003	< 0.010	< 0.010	32.6	0.002	554.3
06/01/92	20	2300	6.5	0.080	2.28	< 0.003	< 0.010	< 0.010	31.2	0.002	565.2

DATE: 10/23/92
TIME: 12:58:30

COLUMBIA,TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: 19-5
SITE NO: 19
SITE NAME: FURNACE RAILROAD YARD

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
03/23/87	18	640	6.5	0.240	6.47	< 0.050	< 0.040 *	0.000 *	0.0	0.007	566.1
06/08/87	22	432	7.0	0.035	7.42	< 0.050	< 0.040 *	0.000 *	0.0 N	0.000	565.4
09/01/87	21	472	8.0	0.090	9.16	< 0.050	< 0.040 *	0.000 *	0.0	1.520	565.0
12/07/87	16	702	7.4	0.090	8.35	< 0.050	< 0.040	< 0.050	7.0	2.130	565.4
03/07/88	16	855	7.3	0.493	7.10	< 0.050	< 0.040	< 0.050	< 5.0	0.053	566.9
06/06/88	19	488	7.4	0.101	7.95	< 0.050	< 0.040	< 0.050	7.0	0.110	564.9
09/06/88	19	570	11.3	0.040	7.45	< 0.050	0.400	< 0.050	8.0	0.162	564.9
12/05/88	14	1002	6.8	0.200	8.00	< 0.003	< 0.010	< 0.010	5.3	0.132	566.
03/06/89	17	1032	7.5	0.167	6.51	< 0.003	< 0.010	< 0.010	5.0	7.800	568.0
06/12/89	17	542	7.0	0.117	8.71	< 0.003	< 0.010	< 0.010	< 5.0	0.003	566.1
09/11/89	19	490	7.4	0.030	8.35	< 0.003	< 0.010	< 0.010	< 5.0	0.004	566.
12/04/89	18	735	7.2	0.069	13.10	< 0.003	< 0.010	< 0.010	7.0	0.071	566.8
03/12/90	18	586	7.4	0.082	8.04	< 0.003	< 0.010	< 0.010	6.0	0.815	567.2
06/01/90	18	470	7.2	0.074	8.19	< 0.003	< 0.010	< 0.010	7.0	0.005	566.2
09/10/90	19	420	7.1	0.080	9.28	< 0.003	< 0.010	< 0.010	6.9	0.006	564.8
12/03/90	18	380	7.2	0.109	10.60	< 0.003	< 0.010	< 0.010	< 5.0	0.002	567.8
03/18/91	18	450	7.4	0.068	7.81	< 0.003	< 0.010	< 0.010	6.7	0.002	565.9
06/03/91	19	610	7.0	0.333	6.44	< 0.003	< 0.010	< 0.010	16.5	0.002	567.0
09/09/91	21	750	7.2	0.204	9.20	< 0.003	< 0.010	< 0.010	< 5.0	0.005	564.6
12/09/91	19	400	7.6	0.317	5.58	< 0.003	0.294	< 0.010	< 5.0	0.002	568.1
03/02/92	19	390	7.5	0.131	8.26	< 0.003	< 0.010	< 0.010	< 5.0	0.002	566.3
06/01/92	18	480	7.4	0.180	6.11	< 0.003	< 0.010	< 0.010	< 5.0	0.002	565.6

ENTER CODE FOR CHOICE OF ACTIVITY w

DATE: 10/22/92
TIME: 13:00:43

COLUMBIA,TENNESSEE PLANT
GROUNDWATER QUALITY DATA
SUMMARY BY WELL NO.
01/01/87 THRU 07/01/92

WELL NO: 19-7
SITE NO: 19
SITE NAME: FURNACE RAILROAD YARD

DATE	TEMP DEG C	COND UMHOS	PH	PO4 PPM	FLUO PPM	LEAD PPM	CR PPM	AS PPM	CYAN PPB	P4 PPB	ELEV SLF
03/23/87	18	1017	6.8	0.280	4.87	< 0.050	< 0.040 *	0.000 *	0.0	0.028	566.4
06/08/87	21	815	7.4	0.620	5.24	< 0.050	< 0.040 *	0.000 *	0.0 N	0.000	565.5
09/01/87	26	882	7.4	0.760	5.44	< 0.050	< 0.040 *	0.000 *	0.0	1.520	565.2
12/07/87	16	904	7.6	0.780	6.64	< 0.050	< 0.040	< 0.050	15.7	2.130	565.6
03/07/88	16	1398	7.2	0.186	4.25	< 0.050	< 0.040	< 0.050	11.0	0.002	566.9
06/06/88	20	695	7.1	1.150	6.05	< 0.050	< 0.040	< 0.050	9.0	20.000	563.2
09/06/88	19	820	7.3	0.750	5.45	< 0.050	< 0.040	< 0.050	11.0	0.064	564.9
12/05/88	17	1250	6.9	0.860	6.30	< 0.003	< 0.010	< 0.010	30.0	9.900	566.1
03/06/89	17	1430	7.4	0.690	5.33	< 0.003	< 0.010	< 0.010	7.6	9.000	567.7
06/12/89	17	847	7.0	0.652	5.85	< 0.003	< 0.010	< 0.010	8.0	0.003	566.3
09/11/89	19	740	7.1	0.630	6.23	< 0.003	< 0.010	< 0.010	11.7	0.024	566.2
12/04/89	19	1066	6.5	0.686	6.06	< 0.003	< 0.010	< 0.010	12.0	0.078	566.9
03/12/90	19	663	7.1	0.732	7.78	< 0.003	0.020	< 0.010	10.0	1.500	567.3
06/01/90	18	680	6.8	0.687	6.56	< 0.003	< 0.010	< 0.010	12.0	0.006	566.3
09/10/90	19	740	6.6	0.980	6.80	< 0.003	< 0.010	< 0.010	8.2	0.002	564.7
12/03/90	18	520	7.2	0.403	5.97	0.011	< 0.010	< 0.010	6.0	0.004	568.0
03/18/91	18	1100	7.4	0.502	5.22	0.003	< 0.010	< 0.010	51.4	0.002	566.0
06/03/91	19	1000	6.6	0.704	5.67	< 0.003	< 0.010	< 0.010	21.5	0.002	566.5
09/09/91	22	900	7.3	0.604	4.69	< 0.003	< 0.010	< 0.010	13.5	0.002	564.8
12/09/91	19	990	7.0	0.285	4.51	< 0.003	< 0.010	< 0.010	< 5.0	0.002	568.0
03/02/92	19	990	7.0	0.239	3.81	< 0.003	< 0.010	< 0.010	8.4	0.002	566.4
06/01/92	19	1500	6.6	0.340	5.28	< 0.003	< 0.010	< 0.010	8.2	0.002	565.7

APPENDIX D
MONSANTO COMPANY
COLUMBIA TENNESSEE PLANT EMERGENCY PLAN
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BRH 2/9
CLJ 2/9
RLP 2/10
file
COPY : C.O.

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE ENVIRONMENTAL FIELD OFFICE
537 BRICK CHURCH PARK DRIVE
NASHVILLE, TENNESSEE 37243-1550

February 9, 1993

Mr. William S. Richey
Environmental Specialist
Monsanto Chemical Company
Columbia, TN 38401

RE: Monsanto Superfund Sites # 60-534
Maury County, TN

Subject: Approval of the Final Remedial Action Report

Dear Mr. Richey:

Division of Superfund staff have reviewed the above referenced report dated December 1992 and find it acceptable. All necessary elements have been included and activities to date at the sites well documented or referenced. The following comments and/or recommendations should be noted:

Generally

1. In an effort to clarify present site activities, we request that you briefly outline what activities are on-going in connection with the Department's other environmental Divisions. For instance, what are the discharge points, locations and parameters monitored under the Water Pollution Control Divisions NPDES program? How many underground storage tanks are being or plan to be closed under the Underground Storage Tank program? What are the locations and activities of any permitted landfills under Solid Waste Management Division oversight? Which, if any, monitoring wells are sampled under that program that are not sampled under the DSF program? Are there any wastes generated which require adherance to Tennessee's Hazardous Management rules and regulations? And finally, are there any present activities that require an APC permit? This is not an all inclusive list and may be added to as appropriate.

This information does not have to be exhaustive in nature but should be outlined in a way to make us more aware of other activities on-going at the Monsanto facility.

2. The annual submittal of a report concerning maintenance activities (as outlined in section 3.1.1) and monitoring data (as outlined in section 3.1.2) should not only include a review of the data but also a summary of the conditions of the sites based on the quarterly inspection reports that will be maintained. Also, the amount of seepage collected and treated from site 12 should be estimated and reported as should yearly expenditures.

3. The revised ROD dated December 31, 1992, has been substituted for the original in Appendix B.

Specifically

1. Under section 2.8 Monitoring Results and Proposed Monitoring, it was proposed to continue monitoring ground water samples from wells 12-1, 12-2, and 12-4 on an annual basis "because these wells are located near an elemental phosphorus 'source'". For this same reason and because of the highly fluctuating nature of sample results for these wells, we request they be monitored on a semi-annual basis.

2. Also under section 2.8, it is proposed to abandon monitoring wells 4-7 and 4-8 because they are frequently dry during sampling events. This is acceptable since there are other wells and springs as receptors for this site. Provisions should be made to properly close out the abandoned wells and Division personnel should be contacted to observe the procedure.

Finally, the additional information requested may be submitted as a letter addendum to the report and may, of course, be prepared in-house. A hand written change to section 2.8 will be made once concurrance with the recommendation has been acknowledged. If there are any questions concerning this correspondence, please do not hesitate to call (741-5940).

Sincerely,

Brenda K. Apple

Brenda K. Apple
Manager, Nashville Field Office
Division of Superfund

RLF 5/11
COPY: WPE/JEH SWM/DR FYI
COPY: C.O.
file 60-537

Monsanto

Monsanto Chemical Company
Columbia, Tennessee 38401
Phone: (615) 388-3431

April 22, 1993

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Ms. Brenda K. Apple, Manager
Nashville Field Office
Division of Superfund
Environmental Field Office
537 Brick Church Park Drive
Nashville, TN 37243-1550

Dear Ms. Apple:

Please include this correspondence as an addendum to the Final Remedial Action Report dated December 1992 for Tennessee Superfund Site Nos. 60-534, 60-535, 60-536, and 60-537.

In your letter of February 9, 1993, you proposed that Monsanto should sample groundwater monitoring well Nos. 12-1, 12-2, and 12-4 on a semiannual frequency rather than annually as proposed by Monsanto. Monsanto agrees to comply with your request for semiannual sampling for the above mentioned wells. Monsanto further understands that with the exception of the above mentioned change in Site 12 well monitoring, the long-term site sampling program will be performed as proposed by Monsanto in Section 2.8 of the above mentioned Final Remedial Action Report.

The remainder of this letter provides the requested summary of ongoing activities associated with environmental divisions (other than Superfund) of the Tennessee Department of Environment and Conservation.

Water Pollution Control Division

The plant is permitted to discharge waste water on NPDES Permit No. TN 0001538 dated 9/20/89. There are three outfalls identified as Nos. 002, 005 and 011. Outfall Nos. 002 and 011 are located on the Duck River at mile 122.4 and 124.5 respectively. Outfall 005 is located on Greenlick Creek at mile 1.5. A map indicating outfall locations is enclosed.

Parameters monitored under the plant NPDES permit include the following:

Flow
pH
Total Suspended Solids
Total Phosphate (reported as Phosphorus)
Soluble Fluoride
Elemental Phosphorus
Cyanide
Residual Chlorine
Biotoxicity (utilizing Ceriodaphnia as test species)

The plant has submitted a notice of intent to file for a "Baseline General Permit to Discharge Stormwater Associated with Industrial Activity." The plant is awaiting assignment of a permit identification number.

In preparation for closure of the plant elemental phosphorus production facility, Monsanto voluntarily conducted an extensive environmental impact study to define and assess the environmental impact of active and inactive plant processing and disposal areas. This study was followed by development of comprehensive remedial action and hydrologic monitoring plans for site closure and monitoring. These plans were presented to the heads of the Tennessee Environmental regulatory agencies in 1986. Beginning with first quarter 1987, Monsanto, in accordance with its hydrologic monitoring plan, began voluntarily reporting groundwater and surface water sampling results to the Division of Superfund, Division of Solid Waste Management, Division of Water Supply, Division of Water Pollution Control, and Division of Air Pollution Control. The above mentioned wells and surface points are sampled and reported quarterly. A listing of the present sampling points and parameters analyzed is shown in Table I attached.

Underground Storage Tank Division

The plant has no petroleum underground storage tanks and one process underground storage tank. This tank has been emptied, cleaned, and placed in temporary closure status. Use of the tank depends on the needs of the plant Phosphorus Drumming (Repackaging) operation.

Solid Waste Management Division

The plant has two permitted landfills including a Sanitary/-Demolition Landfill, Registration No. IDL 60-102-0030, and an Industrial Demolition Landfill, Registration No. DML 60-102-

0017. Landfill IDL 60-102-0030 is located approximately 3,200 feet west of the plant complex, and IDL 60-102-0017 is located approximately 2,000 feet southeast of the plant complex. Both landfill locations are shown on the enclosed map.

Landfill IDL 60-102-0030 (constructed in 1980) receives minor quantities of non-hazardous office waste, garbage and demolition wastes generated on-site by plant personnel. Groundwater is monitored by three wells, Nos. 10-1, 10-2, and 10-3, with sampling results reported quarterly to the Division of Solid Waste Management. This landfill is undergoing closure which is scheduled for completion by the end of 1993.

Landfill DML 60-102-0017 was built primarily to receive demolition wastes from dismantling of the plant elemental phosphorus production facility which was shut down in late 1986. In addition to routine demolition wastes the landfill was permitted to receive phosphorus contaminated demolition wastes, asbestos, residue remaining from processing contaminated phosphorus product for phosphorus recovery, and sludge (filtercake) residue remaining from treatment of phosphorus contaminated process water, stormwater, and groundwater. In 1993 the landfill permit was modified to add disposal of internally generated plant sanitary wastes.

Although landfill DML 60-102-0017 did not require A RCRA interim status or Part B permit, the landfill was constructed with double synthetic liners and leachate collection facilities. Leachate is treated on-site with the phossy water treatment plant.

Plans are to continue use of landfill DML 60-102-0017 for the foreseeable future to dispose of internally generated non-RCRA hazardous plant wastes. Groundwater at the landfill area is monitored by four wells, Nos. 13-1, 13-2, 13-3 and 13-4, with sampling results reported quarterly to the Division of Solid Waste Management.

Occasionally, TCLP toxic residue is generated from processing contaminated phosphorus product for phosphorus recovery in the plant's phosphorus recovery distillation unit. This waste is shipped off-site for disposal. Phosphorus contaminated process water, stormwater, and groundwater are processed through the NPDES permitted plant phossy water treatment plant. The effluent is discharged through NPDES Outfall 002.

Air Pollution Control Division

The plant has six Tennessee Division of Air Pollution Control air discharge permits. Permit No. 026524P covers emissions from the plant phosphorus recovery distillation unit. Permit No. 028141P covers emissions from the plant phossy water treatment plant.

Permit Nos. 018290P and 018291P cover emissions from the Phosphorus Handling/Drumming process. Finally, Permit No. 018293F covers emissions from the two plant natural gas fired boilers.

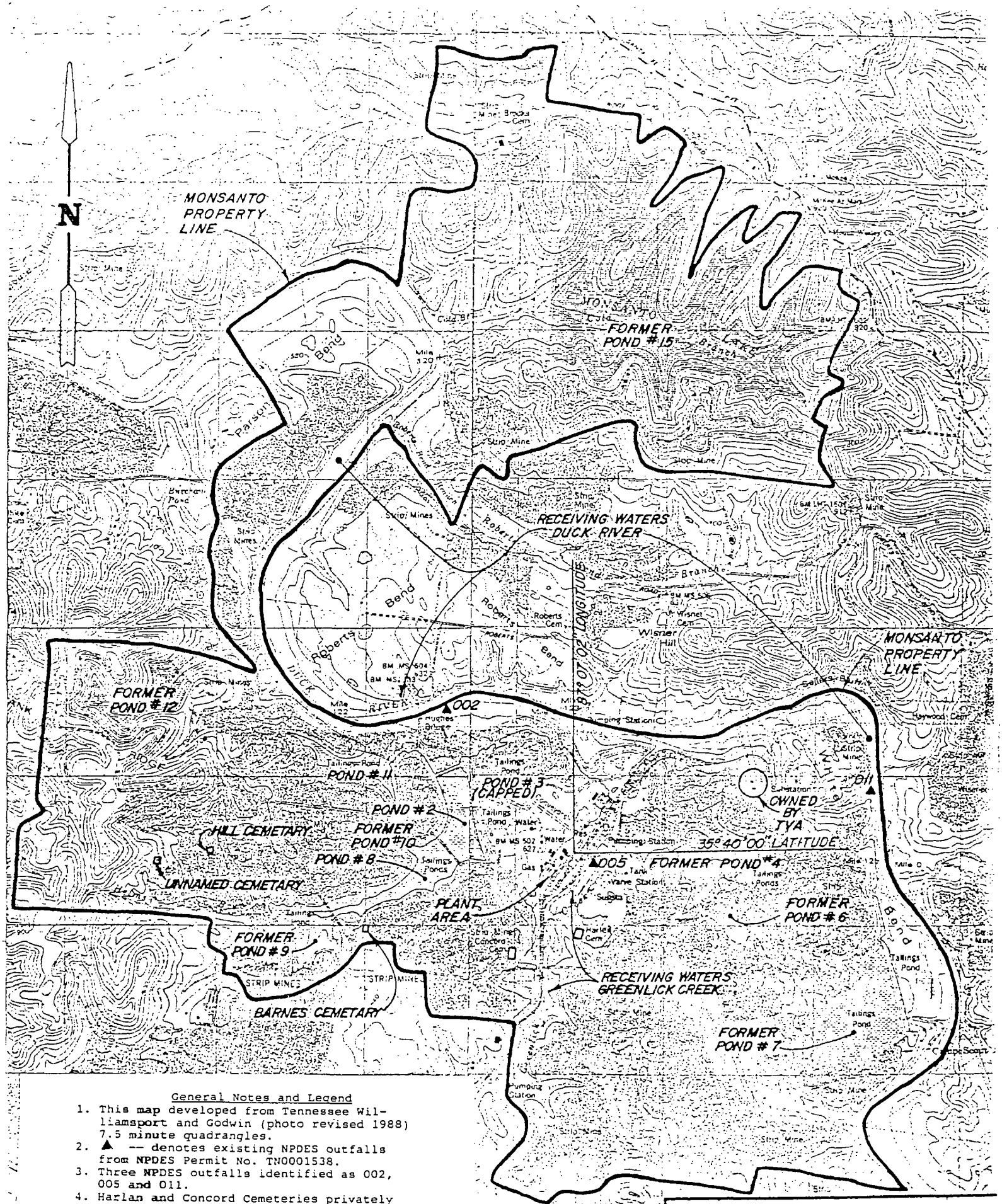
Monsanto believes that this letter supplies all information required in your letter of February 9, 1993. If you have questions or need further information, please contact me by telephone at 615-380-9316.

Sincerely,

William S. Richey
Environmental Specialist

/st

Enclosures



General Notes and Legend

1. This map developed from Tennessee Williamsport and Godwin (photo revised 1988) 7.5 minute quadrangles.
2. ▲ -- denotes existing NPDES outfalls from NPDES Permit No. TN0001538.
3. Three NPDES outfalls identified as 002, 005 and 011.
4. Harlan and Concord Cemeteries privately owned/not Monsanto property.

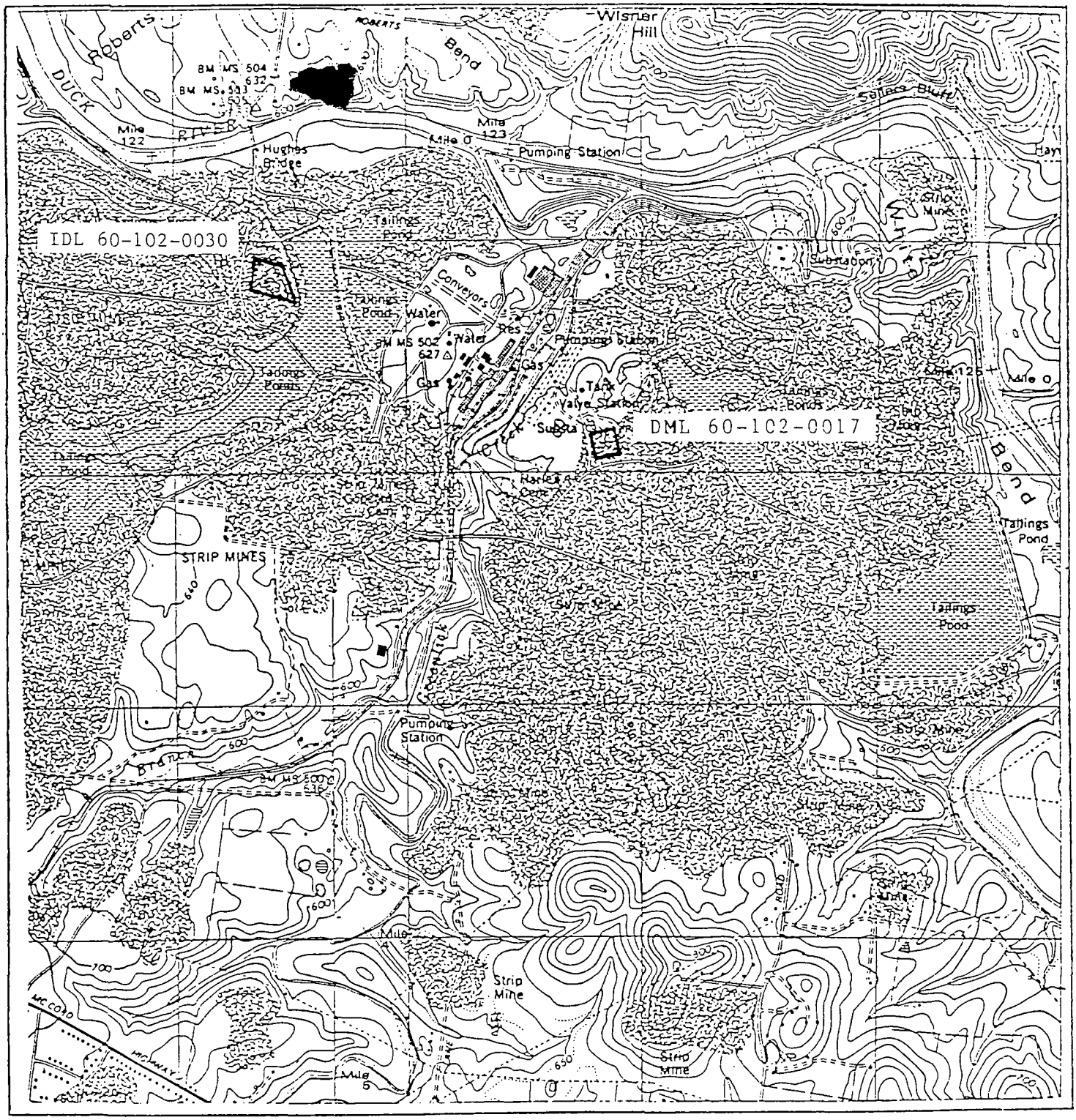
Location Map
NPDES Outfalls
Monsanto Company Plant
Columbia, Tennessee 4/7/93

TABLE I

MONSANTO COMPANY
COLUMBIA, TENNESSEE PLANT
HYDROLOGIC MONITORING PLAN
GROUNDWATER SAMPLE DATA

SITE NO.	SITE NAME	WELL NO.	Elev. Top of WATER	Flow RATE	TEMP.	Sp. COND.	PH	Sol. PO4 AS P4	Sol. F	Sol. Pb	Cr	As	Cn	
01	CLOSED PHOSPHORUS LANDFILL	1-2A	x		x	x	x	x	x	x	x	x	x	x
01	CLOSED PHOSPHORUS LANDFILL	1-6	x		x	x	x	x	x	x	x	x	x	x
01	CLOSED PHOSPHORUS LANDFILL	1-7	x		x	x	x	x	x	x	x	x	x	x
03	CLOSED PHOSPHORUS BARREL DUMP	3-EAST	x		x	x	x	x	x	x	x	x	x	x
04	PHOSPHORUS SLURRY DUMP	4-5	x		x	x	x	x	x	x	x	x	x	x
04	PHOSPHORUS SLURRY DUMP	4-6	x		x	x	x	x	x	x	x	x	x	x
04	PHOSPHORUS SLURRY DUMP	4-7	x		x	x	x	x	x	x	x	x	x	x
04	PHOSPHORUS SLURRY DUMP	4-8	x		x	x	x	x	x	x	x	x	x	x
05	CLOSED SOLID/SANITARY WASTE DUMP	5-15	x		x	x	x	x	x	x	x	x	x	x
05	CLOSED SOLID/SANITARY WASTE DUMP	5-16	x		x	x	x	x	x	x	x	x	x	x
06	CLOSED TREATER OIL SITE	6-2	x		x	x	x	x	x	x	x	x	x	x
09	PROCESS POND NO. 3	9-3	x		x	x	x	x	x	x	x	x	x	x
09	PROCESS POND NO. 3	9-4	x		x	x	x	x	x	x	x	x	x	x
09	PROCESS POND NO. 3	9-6	x		x	x	x	x	x	x	x	x	x	x
09	PROCESS POND NO. 3	9-7	x		x	x	x							
09	PROCESS POND NO. 3	9-8	x		x	x	x							
10	ACTIVE SANITARY LANDFILL	10-1	x		x	x	x	x	x	x	x	x	x	x
10	ACTIVE SANITARY LANDFILL	10-2	x		x	x	x	x	x	x	x	x	x	x
10	ACTIVE SANITARY LANDFILL	10-3	x		x	x	x	x	x	x	x	x	x	x
12	TANK FARM	12-1	x		x	x	x	x	x	x	x	x	x	x
12	TANK FARM	12-2	x		x	x	x	x	x	x	x	x	x	x
12	TANK FARM	12-4	x		x	x	x	x	x	x	x	x	x	x
13	NEW PHOSPHORUS LANDFILL	13-1	x		x	x	x	x	x	x	x	x	x	x
13	NEW PHOSPHORUS LANDFILL	13-2	x		x	x	x	x	x	x	x	x	x	x
13	NEW PHOSPHORUS LANDFILL	13-3	x		x	x	x	x	x	x	x	x	x	x
13	NEW PHOSPHORUS LANDFILL	13-4	x		x	x	x	x	x	x	x	x	x	x
16	CWS BUILDING	16-OB2-1	x											
16	CWS BUILDING	16-OB2-2	x											
16	CWS BUILDING	16-OB2-3	x											
16	CWS BUILDING	16-OB2-4	x											
16	CWS BUILDING	16-OB2-5	x											
17	FURNACE DEPARTMENT	17-5	x		x	x	x	x	x	x	x	x	x	x
19	FURNACE RAILROAD YARD	19-1	x		x	x	x	x	x	x	x	x	x	x
19	FURNACE RAILROAD YARD	19-3	x		x	x	x	x	x	x	x	x	x	x
19	FURNACE RAILROAD YARD	19-4	x		x	x	x	x	x	x	x	x	x	x
19	FURNACE RAILROAD YARD	19-5	x		x	x	x	x	x	x	x	x	x	x
19	FURNACE RAILROAD YARD	19-7	x		x	x	x	x	x	x	x	x	x	x
20	MILLION GALLON TANK	20-8	x		x	x	x	x	x	x	x	x	x	x
POINT 1	GREG'S SPRING	P1		x	x	x	x	x	x	x	x	x	x	x
POINT 2	GIN CREEK	P2		x	x	x	x	x	x	x	x	x	x	x
POINT 3	UPPER GREENLICK CREEK	P3		x	x	x	x	x	x	x	x	x	x	x
POINT 4A	SOUTH NO. 13 BASIN	P4A			x	x	x	x	x	x	x	x	x	x
POINT 4B	MIDDLE NO. 13 BASIN	P4B			x	x	x	x	x	x	x	x	x	x
POINT 4C	NORTH NO. 13 BASIN	P4C			x	x	x	x	x	x	x	x	x	x
POINT 5	GREENLICK CREEK	P5		x	x	x	x	x	x	x	x	x	x	x

"x" = Parameter Analyzed



LOCATION MAP
Adapted from USGS Williamsport and Godwin Quadrangles
Scale: 1 inch = 2000 feet

MONSANTO COMPANY ACTIVE PERMITTED LANDFILL LOCATIONS